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THE SOUTHWORTH-STONE ARITHMETIC

MANUAL FOR TEACHERS

BENJ. H. SANBORN & CO



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A MANUAL FOR TEACHERS
-O
TO ACCOMPANY
THE SOUTHWORTH-STONE ARITHMETICS

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**THE
SOUTHWORTH-STONE ARITHMETIC**

THREE-VOLUME EDITION

Book I. Primary

Book II. Intermediate

Book III. Advanced

TWO-VOLUME EDITION

Book I. For Lower Grades

Book II. For Higher Grades

WITH OR WITHOUT ANSWERS

**COPYRIGHT, 1904, BY
GORDON A. SOUTHWORTH AND JOHN C. STONE**

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PREFACE

THIS "Manual for Teachers" has been prepared by the authors of "The Southworth-Stone Arithmetics" as an aid to those teachers who use the books.

It contains an eight-year "Course of Arithmetic Study" in outline, preceded by a few pages of General Suggestions on the teaching of arithmetic. In the arrangement of this "Course" the order of subjects as given in the Arithmetics has been followed. In this order as well as in the distribution of work among the grades it is in harmony with the Courses of Study as planned by experts for cities and towns that lead in the character of their schools. The suggestions that accompany it are based both on pedagogical principles and successful experience.

The "Manual" also gives helpful suggestions on the use of the books of the Southworth-Stone Series by way of methods and model solutions. The solutions of many of the more difficult problems are presented, and for the convenience of teachers the answers to all exercises in the books have been added.

The authors invite correspondence on any points that may arise in the use of the books, and will be glad to furnish further suggestion and assistance if in their power.



CONTENTS

	PAGE
1. GENERAL SUGGESTIONS ON THE TEACHING OF ARITHMETIC TO PRECEDE COURSE OF STUDY	1-10
2. A COURSE OF ARITHMETIC STUDY IN OUTLINE FOR EIGHT YEARS	11-31
First-Year Outline	11
Second-Year Outline	13
Third-Year Outline	16
Fourth-Year Outline	19
Fifth-Year Outline	22
Sixth-Year Outline	25
Seventh-Year Outline	27
Eighth-Year Outline	29
3. SUGGESTIONS TO TEACHERS OF THIRD- AND FOURTH-YEAR CLASSES, on Use of Book I (Three-Volume Edition) or Book I, Chapters 1 and 2 (Two-Volume Edition) . . .	32-35
4. SUGGESTIONS AND SOLUTIONS, FIFTH AND SIXTH YEARS, Book II (Three-Volume Edition), or Book I, Chapter 3, and Book II, Chapter 1 (Two-Volume Edition) . . .	36-42
5. SUGGESTIONS AND SOLUTIONS, SEVENTH AND EIGHTH YEARS, Book III, (Three-Volume Edition), or Book II, Chapters 2 and 3 (Two-Volume Edition)	43-116
6. ANSWERS THREE-VOLUME EDITION, BOOK I, PART 1 . . .	1
" " " BOOK I, PART 2 . . .	7
" " " BOOK II, PART 1 . . .	15
" " " BOOK II, PART 2 . . .	23
" " " BOOK III, PART 1 . . .	34
" " " BOOK III, PART 2 . . .	43
TWO-VOLUME EDITION, BOOK I, CHAPTER 1 . . .	1
" " " BOOK I, CHAPTER 2 . . .	7
" " " BOOK I, CHAPTER 3 . . .	15
" " " BOOK II, CHAPTER 1 . . .	23
" " " BOOK II, CHAPTER 2 . . .	34
" " " BOOK II, CHAPTER 3 . . .	43



A COURSE OF ARITHMETIC STUDY

FOR ELEMENTARY SCHOOLS

To accompany "The Southworth-Stone Arithmetics"

GENERAL SUGGESTIONS TO TEACHERS

1. This Course of Study presupposes teachers who are fully equipped for their work, who understand the true object of education, the fundamental principles of teaching, and the best methods, and who realize the fact that they alone can vitalize and make effective the directions given in the following pages. No harm, however, can come from a restatement of certain *underlying principles* that must constantly be borne in mind.

(a) The ability and needs of the learner must control the matter and method of all teaching.

(b) The powers of the mind should be exercised in a natural order. Observation precedes reasoning; the concrete comes before the abstract; facts before principles or definitions; processes before rules; from the particular we proceed to the general; from the simple to the complex; from the known to the unknown.

(c) The mind acquires knowledge only by its own activity. The degree in which this activity is awakened is a measure of the teacher's success.

(d) Primary ideas in every branch of knowledge must be presented objectively in all grades.

(e) Mental power is a more valuable result of teaching than mere knowledge. Hence the process of acquiring becomes

more important than the knowledge acquired. Power abides; facts are forgotten.

2. Each teacher should acquaint herself with the work of other grades than her own, that constant and intelligent reviews, presenting subjects in new lights, may confirm what has been taught, and that previews of the needs of higher grades may rightly influence the character of the teaching.

3. Each school exercise, whatever its character, should have some fixed and definite *purpose*, some appropriate place in the education or development of the child. To determine this purpose, and to secure its accomplishment, careful previous thought and preparation are demanded. Each exercise should be planned in detail, its aim should be clearly defined in the teacher's mind, and pursued until the point is made and the object attained.

4. *The aim* in a course in arithmetic should be twofold:—

(1) To give a practical *knowledge* of the subject and *skill* in use of numbers;

(2) To discipline the mind in *right thinking*,—in analysis, comparison, and judgment,—in logical reasoning.

While the general aim in teaching arithmetic is both practical and disciplinary, the practical and the disciplinary elements may not be of equal importance in a given year or in a given lesson. The first phase of the subject should be made more prominent in earlier years, the second should be emphasized as pupils mature. It is, however, difficult and undesirable if not impossible, wholly to separate what is practical from what is disciplinary in the process of instruction, for even in the presentation of

the simplest forms of knowledge, right methods and the application of sound pedagogical principles will train the observation, the attention, the imagination, the memory, the reason. The teacher of arithmetic, however, should have a clear and definite purpose in every lesson. She should know the true order of topics and the best method of presenting them, and she should adapt her teaching to the needs and the attainment of her pupils.

5. *The practical side* of arithmetic demands that as a general knowledge of the subject is developed, the learner shall be trained to (1) accuracy and (2) rapidity in the use of numbers, and (3) acquire skill to choose the best solution of a problem.

6. *Accuracy* in the fundamental processes is of the first importance, and to it other desiderata must be subordinated. To secure it at least four things are essential: —

- (1) Perfect familiarity with arithmetical facts;
- (2) A thorough acquaintance with elementary processes,
- (3) The formation of careful, painstaking habits;
- (4) Abundant practice.

7. *Rapidity* is not inconsistent with accuracy. Indeed it is a help towards it, for in rapid work the thought is concentrated upon operations to be performed to the exclusion of what is distracting and diverting. To secure rapidity, constant practice and drill are indispensable, not alone when fundamental processes are being taught, but throughout the course. The need of drill is shown by the general superiority in speed of fourth-year classes as compared with those of the seventh or eighth year.

8. *The necessity of practice* in securing the essentials of accuracy and rapidity has led the authors of "The Southworth-Stone Arithmetics" to provide exercises and drill tables in sufficient abundance in the form of abstract work. They should be used until a satisfactory degree of proficiency has been secured, but not beyond that point. While these drill exercises may seem mechanical and repressive, there is no substitute for them, and they cannot be disregarded without positive loss. The ingenious teacher will make them attractive with competitive tests or in other ways. Forms, as on page 36, Book I, or the diagrams for oral drill found therein, tend to add interest. It must be borne in mind, however, that the attention of the class must be occasionally concentrated upon the attainment of accuracy and rapidity. There must be specific exercises with these ends in view. Careless and inaccurate work should be rejected, and the pupil compelled to repeat his work until accurate results are obtained.

9. The second purpose of arithmetic teaching — *discipline in right thinking* — is accomplished chiefly in two ways, —

- (1) By the development of subjects by induction ;
- (2) By the proper analysis and solution of problems.

In the *development of subjects inductively*, "The Southworth-Stone Arithmetics" are a manual in themselves. The simple questions and oral problems that precede each new subject are a guide to both teacher and pupils in seeing the true relation of the several topics. In approaching any subject, therefore, the simple questions leading up to principles or methods are of fundamental importance, and should never be omitted. They are often, however, only types, and may well be supplemented and extended by the teacher. These questions in the text may

either be assigned as a new lesson, or, if not sufficiently complete under existing conditions, the teacher may first develop the subject with supplementary questions and assign those of the text as a review lesson before taking up the written work.

10. *The solution and analysis* of problems will prove a second important means of developing power if based on correct principles. The custom of solving problems by formulæ or rule relieves the student from the necessity of thinking or analyzing, and simply gives practice in figuring. So, too, the page of problems with an identical form of solution has little or no educational value. A problem should give the student something to think about and suitably task his powers. It should first of all be thoroughly understood. It should be thoughtfully analyzed and a correct notion formed of "what is given," "what is required," and "their relations." This will lead to the discovery of "what is to be done." A statement of all the work to be performed should then be made and the resulting equation solved by the shortest process.

The study of a problem will often show that its conditions, or the relations of the numbers, are such as to make its solution a matter of simple mental calculation.

11. The character of the *analysis of a problem* depends upon the age and the attainment of the pupil. In lower grades little or nothing should be expected. In reply to questions the child may tell the various steps of the process, and as far as may be, give the reasons therefor. There should be a gradual advance, however, as the child grows in maturity. Correct statements and good language should be employed, but the analysis should be simple and free. It should not follow stereotyped forms or

formulae. The student's mathematical knowledge often outruns his power of language, and his own statements, even if crude, are better than mechanical forms made for him. In the higher grades, however, concise, logical analyses should be required.

12. *Oral work* in every subject is more important than written work, and should invariably precede it. It constitutes a large and perhaps the most practical part of the course. In developing a new principle, the numerical work should be easy; small numbers should be used. This allows the whole thought to be placed upon the reasoning process. A large number of easy examples will enforce a principle better than a few difficult ones.

13. *Not a school day should pass without more or less oral work.* The mind should be reached through both the eye and the ear. The former is easier for the child. Problems may be solved at sight from either book or board. More often, however, they should be dictated (and but once) by the teacher. In this exercise the entire class or division should participate, each pupil writing the result in the limited time. When problems are solved orally and analyzed, the reciting division should be very small, for it is the exceptional teacher who can hold the attention and stimulate the mental activity of many pupils in such an exercise.

It is often well to allow pupils to prepare and dictate original problems for oral solution. The variety and practical nature of the problems thus given will often be surprising.

14. While the pupil should always be ready to describe the process used in the solution of problems, the learning and repeti-

tion of *rules* have ordinarily no value. A rule should invariably follow the development or the discovery and the use of the process. When the process has become perfectly familiar, or has been simplified by the pupil, a formulation of a succinct statement thereof will be an excellent language exercise.

15. So, too, the learning of *definitions* should be postponed until the object of thought has been fully presented, is thoroughly comprehended, and has been used in practice. There should be no hesitation on the part of the teacher in the use of technical, mathematical terms. Children learn the names of things used in arithmetic just as they learn the names of countless objects in the world about them.

Definitions of mathematical terms alphabetically arranged will be found in "The Southworth-Stone Arithmetics," and may be used when convenient.

16. A *process* that has no value except as a means to an end should be *introduced only when need for it arises*. For example, the subject of the least common multiple has no value nor interest to the child except as an aid in changing fractions to like units. The greatest common divisor is important only as it is related to the changing of small fractional units to larger ones. These subjects, therefore, should not be taught independently but only as needed in fractional work. In this way the pupil is led to see the fundamental unity of the whole subject rather than to think of it as consisting of many unrelated parts.

17. A *unit* in mathematics is that which is taken as the basis in comparing, measuring, or counting. Units exist in a great variety of kinds and sizes. For example, each of the following

numbers is composed of units distinctly different in kind and size: 12 dollars, 7 feet, $\frac{3}{4}$ days, $\frac{7}{8}$ pounds, 0.15 bushels. 1-tenth, 1-sixth, etc., are units just as much as 1 dollar. We should speak of the primary or integral units as *ones* rather than as "units," as is very generally done. In 345 the units expressed by the 3 are hundreds, by the 4, tens, and by the 5, ones.

18. A *fractional unit* should be recognized as a unit as much as an integral unit. In the fraction $\frac{3}{8}$, the pupil should think of the number 3 whose unit is $\frac{1}{8}$, or in $\frac{4}{7}$ the number 4 whose unit is $\frac{1}{7}$, etc. If the fundamental and general principle, "Only like units can be added or subtracted" is well established, the pupil will see that in adding or subtracting fractions it is necessary to change them to like units. It is much better to use the direct expression, "Change to like units," than to say, "Reduce to a common denominator." The direction, "Change to largest units," is better than, "Reduce to lowest (or smallest) terms." Avoid circumlocution.

19. *Neat and careful written work* should always be insisted upon as an essential to clear thinking. Statements or equations should be correctly made, processes indicated, and denominations properly marked. Care should be taken that figures and signs are made of the proper form and size. Pupils, however, should avoid unnecessary written work in the solution of a problem. Such part of the work as can be done orally need not be written. Combinations or arrangements of the factors that will save work should be sought and used. For example,—

$$(a) \frac{39}{19} \times 56 = 2 \times 56 + \frac{1}{19} \text{ of } 56 = 112 + 2\frac{18}{19} = 114\frac{18}{19}$$

$$(b) 25 \times 27 = 25 \times 25 + 2 \times 25 = 625 + 50 = 675$$

$$(c) 27 \times 35 = 30 \times 35 - 3 \times 35 = 1050 - 105 = 945$$

If the pupil is on the watch for such combinations, he becomes familiar with number relations, and time is saved, and much of the drudgery taken away. It is also more in accordance with actual business methods.

20. *Short methods* should not be introduced until the pupil understands the general methods of which they are abbreviated forms. In fact, they should be discovered by the pupil himself.

When a simple relation exists between what is wanted and what is given, this relation or ratio should be used rather than the longer form of unitary analysis. For example, "When 17 tons of coal cost \$110.50, find the cost of 51 tons." Now since the cost of what is wanted is three times the cost of what is given, the pupil should multiply \$110.50 by 3 rather than divide by 17 and multiply by 51. "The Southworth-Stone Arithmetics" lead the pupil from the third year to look for such relations. Such multiplications as $\frac{12}{11} \times 36$ ought to be performed by thinking $36 + \frac{1}{11}$ of 36 or $39\frac{3}{11}$ rather than $(12 \times 36) \div 11$.

$8 \times 36 + 8 \times 54$ ought to be thought of as 8×90 or 720, rather than as separate multiplications. For others of this kind, see "The Southworth-Stone Arithmetics."

21. There may be too much *objective teaching* or there may be too little, and either extreme is to be avoided. The first extreme is often illustrated in lower grades, the other in higher grades. There are few subjects in arithmetic the first presentation of which may not well be illustrated by the use of objects. Every class should be provided with what is needful to help its special work. Counters, forms for illustrating surfaces and solids of all kinds, measures in variety should be accessible.

As far as convenient, actual measurements of distances and surfaces and solids should be made and actual business transactions conducted. The effort should be to vitalize the subject and correlate it with the affairs of everyday life.

22. In all grades a minimum amount of required *work* should be *assigned* for all members of the class, and sufficient optional or elective work for the most proficient. The required work should cover all the essential principles, and the elective work should be interesting, broad in its scope, practical, and as closely related to business and-everyday experience as possible.

23. The Course of Study that follows is intended to cover eight years of the elementary school period. In schools where this period is limited to eight years, children generally enter at six years of age and finish at fourteen. In such schools the *grade number* and that of the *year outline* will be *identical*.

In schools where the elementary period covers nine years, the ages extend from five to fourteen. In the opinion of experts no formal arithmetic should be taught to five-year old children. Ideas of numbers and their forms will be obtained incidentally as other subjects more in accord with their mental development are presented. In these schools of nine grades the *number of the Outline* in the Course is the *number of the year* in which arithmetic is studied. It is *one less* than the grade number.

COURSE OF STUDY OUTLINED

FIRST-YEAR OUTLINE

Expression. Reading and writing Arabic numbers to 100; Roman numerals to XII, using clock dial; fractional forms used, $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$. Signs, +, —, =.

Suggestions. (1) Figures and signs are not to be used until their meaning is thoroughly understood. They should then be taught with as much care as script letters.

(2) Script or printed number words should be read before figures are used. The page numbers in reading books should be easily found and read. Numeration should precede notation.

Integers. Teach the numbers objectively from 1 to 10 inclusive; recognition of the number without counting; combining, separating, taking away, and comparing groups of objects, first visible and then invisible; counting by ones and tens to 100.

Suggestions. (3) The power to recognize instantly the number of objects in a group from one to ten without counting should be cultivated, and will prove of great value in future work. For this purpose objects may be arranged on number table, or board, or cards, in various forms. This work precedes the use of figures.

(4) Addition and subtraction are to be treated as correlative processes. For example, when the child learns that 3 and 5 are 8, he learns that either part taken from 8 leaves the other. Results should be announced instantly.

(5) The use of visible objects should be abandoned as soon as the pupil has learned to image them. Discriminate constantly between numbers and their symbols.

(6) In this year numbers may be compared by showing differences. Thus, 8 is 3 more than 5, and 5 is 3 less than 8.

(7) In counting, be sure that ordinal numerals are not mistaken for cardinal. Children often think of the *fifth* in a group as *five*.

(8) Technical mathematical names should be used even in the first year. Children will soon add them to their vocabularies.

Fractions. Halves, fourths, thirds of a single object. Teach $\frac{1}{2}$ of 2, 4, 6, 8, 10; $\frac{1}{3}$ of 3, 6, 9; $\frac{1}{4}$ of 4, 8.

Suggestions. (9) The teaching of fractions may be deferred till the latter part of the year. They will, of course, be taught objectively and applied in paper cutting and folding, drawing, measuring, etc.

Denominate Numbers. Cent, nickel, dime; pint, quart; inch, foot; day, week.

Suggestions. (10) The measuring units should be handled and constantly applied in actual measurements. Their reciprocal relations should be taught.

Form and Mensuration. Exercises to develop simple ideas of size, direction, form, likenesses and differences in objects.

Suggestions. (11) Pupils should recognize the terms straight and curved as applied to lines; square, oblong, triangle, and circle, as applied to surfaces; and cube, prism, sphere, and cylinder as applied to solids.

(12) This division of the subject is closely correlated with drawing, designing, paper cutting, and folding, stick laying, the use of blocks, geometrical forms, etc.

Application to Business. Use of coins. Problems of one step within the range of the child's experience and the required limits.

Suggestions. (13) Children will be interested in simple actual business transactions with toy money. They may make original problems to fit a given simple equation. Thus, $7 - 3 = 4$. Tom has seven cents and spends three of them. How many has he left?

Materials. As no text-book is used in this grade, and as the instruction is so largely objective, objects in variety and plenty must be provided. Blackboards, a number table, and paper (or slates) are indispensable. Besides these there should be provided common objects, like buttons, shoe-pegs, grains of corn for counters; sticks or splints one, two, three, four, six, and eight inches long; foot-rulers graduated to inches; squares and oblongs of cardboard of various sizes; one-inch cubes; half-inch cubes; prisms of various dimensions; toy money; pint and quart measures; a clock dial; domino cards; cards for number perception and quick combinations.

Suggestions. (14) Successful number-teaching, especially in the first year, depends upon the skill, enthusiasm, versatility, and training of teachers. Courses of Study are guides and helps. They should not repress or restrict originality, nor be blindly followed when not adapted to peculiar local conditions. The work should be wisely extended or limited in accordance with the varying demands of exceptional pupils or classes.

SECOND-YEAR OUTLINE

Suggestions. (1) While it is not necessary or even desirable that a text-book should be in the hands of second-year pupils, reference will frequently be made in this Course of Study to "The Southworth-Stone Arithmetics," and it should be known that they are published in two forms: First, in three volumes called "Book I," "Book II," and "Book III," and Second, in two volumes called "Book I" and "Book II." In both editions the first 184 pages are numbered alike.

(2) The work of the preceding year is of course included in the work of this year by way of review and farther application. Read the Suggestions for the First Year.

Expression. Reading and writing Arabic numerals to 1,000; Roman numerals to L; time by quarter hours; dollars and cents. Signs, +, —, ×, ÷, =, \$, ¢.

Suggestions. (3) Careful instruction in the making of figures and signs should be given. They should be of good size. All written work should be methodically arranged.

(4) The sign \times follows the multiplier. 4×5 is read 4 times 5 or 4 5's.

Integers. I. The forty-five primary number facts of addition and subtraction. Numbers developed through 20. (See "The Southworth-Stone Arithmetic," pages 6 and 9.)

II. The addition and subtraction of numbers not exceeding three orders. Use not more than five addends.

III. The facts of the multiplication and division tables to 5 times 10. Count forward and backward by 2's, 3's, 4's, 5's within limits of tables learned.

IV. Multiplication and division of numbers not exceeding three orders by digits less than 6, each digit of the dividend to be a multiple of the divisor.

V. Comparison of product with one factor within limits of tables learned. Thus, 24 is 6 times 4; 4 is $\frac{1}{6}$ of 24.

Suggestions. (5) Observe Suggestions 3 and 4, First Year. Multiplication and division are to be taught as correlative processes. Indicated products and quotients should be given instantly at sight.

(6) Drill in increasing and diminishing a series of numbers ending in the same digit by any digit is valuable. Thus, "Add 7 to 36, 56, 86, 46, 16, 66, 96, 76, 26. Subtract 9 from these numbers."

(7) A valuable drill exercise in addition and subtraction is found on page 65 of "The Southworth-Stone Arithmetic," Book I.

(8) In adding let results only be given. Thus, "Add 6, 4, 9, 8." Say 6, 10, 19, 27, not 6 and 4 are 10 and 9 are 19 and 8 are 27. Do not allow counting in the four processes, but resort to drill exercises till the habit is overcome. (See "Arithmetic," page 6.)

(9) Subtraction when "borrowing" is required should be left till the latter part of the year.

(10) The ability to see the relations of numbers quickly should be developed. The comparison of numbers by differences, as in First Year, should give place to comparison by quotients.

Fractions. Halves, fourths, thirds, and sixths of a single object. $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{2}{3}$, $\frac{2}{4}$, $\frac{3}{4}$, $\frac{2}{5}$, $\frac{3}{5}$, $\frac{4}{5}$ of exact dividends within limits of tables learned.

Suggestions. (11) Any of the exercises in partition that are found difficult may be left till the close of the year. Objective teaching will, however, generally remove difficulties. (See Suggestion 5, First Year.)

Denominate Numbers. Measuring units, — pint, quart, gallon; inch, foot, yard; square inch; days in week and months in year; dozen and its fractional parts. All silver coins. Hour and quarter-hours by the clock.

Suggestions. (12) The reciprocal relations of these units should be taught objectively. Within the range of the tables learned, units of one denomination may be changed to those of the next larger or smaller. Use no compound numbers.

Form and Mensuration. (See directions for the preceding year.) Correlate with drawing and manual work. Draw rectangles having dimensions in integral inches. Divide into rows of inch squares. Compare one row with the whole rectangle. Areas of rectangles found within limits of tables learned as an exercise in multiplication.

Suggestions. (13) Pupils should measure lines, using the yard-stick graduated to feet, and the foot-rule graduated to half- or quarter-inches.

(14) Comparisons of lines and similar surfaces may be made.

Application to Business. Simple exercises in buying, selling, and making change. Problems of one step in application of all the number facts thus far learned. Original problems.

Suggestions. (15) Problems should include finding the cost of several when the cost of one is given, and the reverse.

(16) The ability of children to use numbers is generally in advance of their ability to talk and reason about them. Formal analysis and explanation should not be expected in this year.

(17) Daily dictation exercises should be given, results to be announced orally in general, but occasionally in writing. Reach the mind through the ear as well as the eye.

(18) The number of pupils in a reciting division should be limited by the teacher's power to hold the attention and excite the mental activity of every member of it. Every listless child is one too many for the division.

Materials. (See directions for First Year.) Add the gallon measure, the foot-rule graduated to half-inches, the yard-stick graduated to feet, and whatever other objects may be found necessary to a clear understanding of subjects taught.

Suggestions. (19) (See Suggestion 13, First Year.) The work of the Second Year is in the main covered by the first 50 pages of "The Southworth-Stone Arithmetic," to which frequent reference should be made.

THIRD-YEAR OUTLINE

The Course for the third year is practically covered by the first 108 pages of "The Southworth-Stone Arithmetic," Book I, which should be in the hands of the pupils.

Suggestions. (1) Teachers are to familiarize themselves with the work of preceding years and to review and extend it.

Expression. Reading and writing Arabic numbers of five orders; Roman numerals to C: fractions within limits: dollars and cents.

Suggestions. (2) The use of many small numbers is much better than that of a few large ones. Exercises in numeration should precede those in notation, and facility should come incidentally from the ordinary use of numbers.

Integers. I. Constant practice in addition and subtraction, to secure accuracy and rapidity.

Use drill tables found on pages 6, 9, 42, 65, 87, 36, 119.

II. The facts of the multiplication and division tables to 12×12 . Counting forward and backward by 6's, 7's, 8's, and 9's within limits of the tables. Counting forward and backward by 2's, 3's, 4's, to 100, beginning at 1 or 2. Give the pairs of factors of all products in the multiplication table.

Use drill tables found on pages 107, 59, 66, 83, 93, 94.

III. Written exercises in multiplication and division, no multiplier to exceed 99 and no divisor above 12.

The table on page 179 may be used for drill purposes.

IV. Comparison of numbers — products and factors — within the limits of tables.

Suggestions. (3) The work above outlined is by far the most important part of the assignment for the year. It involves the mastery of all the primary facts of the fundamental processes, upon which readiness and skill for future work depend. Instant recognition of the result of a simple equation should be insisted upon.

(4) A study of the table on page 107 will show that there are really but forty-five different facts in the multiplication tables to be learned. It should be shown that 7 is 7 ones; that 7×8 and 8×7 are identical in results, etc. Children should make their own multiplication tables both with equal addends and in the shorter forms.

(5) (See Note, page 81.) It is sometimes well in exercises in the fundamental processes to fix a time limit to ensure rapidity. Rapid work is generally the most accurate. It is well occasionally to test or check work by using a reverse process, but experts never need to do it.

(6) The comparison of numbers should be applied in such problems as, "When 6 cost \$7, what will 18 cost?" (See page 72.)

(7) Teachers should not feel that time used in drill work is misspent. As a test of proficiency, the 100 results in the first exercise on page 83 may be given in three minutes.

Fractions. Halves, fourths, eighths, thirds, and sixths of a single thing. Halves and fourths compared and added.

In partition,—find fractional parts of exact dividends to 100 within limits of tables.

Suggestions. (8) An excellent form of drill in multiplication and division is suggested in the typical diagrams on page 126. The arrangement of numbers may be varied at will. The fractional parts required should come within the range of the tables studied.

Denominate Numbers. Review and extend the work of the Second Year. Add the measuring units,—pint, quart, peck, bushel; minute, hour, day; ounce, pound; cubic inch.

Change denominate numbers to the next smaller or larger unit. Time by the clock to minutes. (See tables, page 108.)

Suggestions. (9) Objective teaching should be continued, but only as long as it is needed. Oral work should precede written when a new subject is taken. (See General Suggestion 12.)

Form and Mensuration. Apply the measuring units studied. Use quarter-inches. The construction and measurement of rectangles and prisms as an application of multiplication.

Suggestions. (10) This division of the Course is closely related to manual work. Comparisons of surfaces and prisms having integral measurements may be made. Avoid directions like “Multiply the length by the breadth.”

Business Arithmetic. The application in problems of the number facts thus far learned within the range of the pupil’s knowledge and experience. Original problems from abstract data. Problems of two steps. (See Suggestions 15–18, Second Year.)

Suggestions. (11) The most of this line of work should be oral. First of all, the problems should be understood. “Well understood is

half-done." From the outset the pupil should keep in mind the questions, — (a) What is to be found out? (b) What fact is given to help find this? (c) How does what is given compare with what is wanted? (d) What is the process? (e) Is the result reasonable? "Unitary Analysis" may be used, but the more rational and briefer method of comparison should also be employed when possible. (See pages 72, 88, 89 of "The Southworth-Stone Arithmetic," and Stone's "Monograph on the Teaching of Arithmetic," pages 5-7.)

(12) In general, an orderly and logical arrangement of written work should be insisted upon. Exercises may be given with this object chiefly in view. Pupils should be encouraged, however, to use short processes and to dispense with the pencil in such portions of the work as may be performed without it. To insist that details of written work shall always be fully given often represses and discourages bright pupils. (See General Suggestion 19.)

Materials. Whatever materials are needed for objective teaching and illustrative purposes should be at hand for constant use.

Suggestions. (13) Every recitation should have a specific object in view, and complete preparation should be made therefor. Illustrative material, supplementary work, etc., should all be pre-arranged. At the close both teacher and pupils should feel that a definite piece of work has been well and fully done.

FOURTH-YEAR OUTLINE

The Course for the year is covered by "The Southworth-Stone Arithmetic," Book I, Part II, three-volume edition, or Book I, Chapter II, two-volume edition.

Suggestions. (1) The work of the third year is to be reviewed and extended.

Expression. Reading and writing Arabic numbers to seven orders; Roman numerals to M; fractions, mixed numbers, two orders of decimals; dollars and cents.

Suggestions. (2) Do not perplex pupils with drill in notation. The reading of numbers is much more important.

Integers. I. Daily oral practice with small numbers to secure skill in the four operations. Counting by 5's, 6's, 7's to 100, beginning with numbers smaller than the constant used.

Practice as suggested on page 150.

II. Written exercises in the four operations. Multipliers and divisors of three orders. Special work, long division.

III. The two factors of numbers less than 100. Comparison of factors and products thus used. (See Suggestions 4-8, Third Year, and General Suggestion 13.)

Suggestions. (3) Long division affords drill in three of the four fundamental operations and should receive special attention. Many short examples are better than a few long ones. Use divisors at first with a small digit in ones' place.

(4) Discriminate as far as practicable between division and partition. (See page 176.) The forms of notation should be, — for division, $\$18 \div \$3 = 6$; for partition, $\frac{1}{3}$ of $\$18 = \6 .

(5) In connection with factoring it will be found well to extend the multiplication table to include all products less than 72. The object is to secure perfect familiarity with numbers less than 100 and their relations.

Fractions. I. Halves, fourths, eighths, sixteenths; halves, thirds, fourths, sixths, twelfths; fifths, tenths of a single thing. Addition and subtraction within each of these series; changing fractions to smaller units, to larger units, to like units; improper fractions changed to mixed numbers; mixed numbers added and subtracted; multiplication of an integer by a mixed number. (See General Suggestion 18.)

II. Comparison of two fractions in any given series by use of diagrams.

III. Fractional parts of exact dividends within range of factors learned.

IV. The fundamental operations applied to decimals of two orders. Only integral multipliers and divisors to be used.

Suggestions. (6) Fractions should be developed and taught objectively. Diagrams and paper cutting and folding should be used as needed.

(7) Only the business fractions named should be used. No common unit smaller than 16ths, or 12ths, or 10ths should be used in a series.

(8) (See General Suggestion 16.) An improper fraction appears as the result of an addition, and is then to be simplified in form as a mixed number.

(9) Decimals may first be used in the concrete form of cents, and then treated as abstract numbers.

(10) The general character and range of the work in fractions is shown on pages 178-181.

Denominate Numbers. I. Liquid, dry, length, and time measures; avoirdupois weight; square inch, foot, and yard; cubic inch, foot, and yard; dozen, gross, quire. (See page 108.) The tables are to be learned and applied in measurements of various kinds.

II. Change of denominate numbers to next larger or smaller unit as an application of multiplication and division.

III. The reciprocal relation of denominate units taught by comparison.

Suggestions. (11) The use of objects when necessary should be continued. A square yard of surface divided into square feet should be set off on board or floor; a cubic-foot box should be provided. The power to image a denominate unit should be well established.

Form and Mensuration. The measuring units thus far learned should be applied in measurements, drawing, and con-

struction. A comparison of squares and similar rectangles may be made when one is an integral measure of the other. (See General Suggestion 21.)

The squares of numbers to 144 and their square roots may be learned in connection with squares.

Suggestions. (12) Care should be exercised to keep instruction and illustration within the limits of the pupil's comprehension.

Business Arithmetic. The knowledge thus far acquired should be applied in oral and written problems, small numbers being mainly used. Problems may be stated in the form of equations before solution. Bills of articles bought or sold may be made and receipted. All work should be within the range of the child's experience or knowledge.

Suggestions. (13) (See General Suggestions 10, 11; Suggestion 12, Third Year.) In problems and bills utilize local conditions. Pupils will gladly secure "bill-heads." Solicit original problems from pupils.

(14) The work of the year should result in the familiarity of the pupil with the relations of numbers less than 100 and a complete mastery of the fundamental processes. If local conditions demand it the requirements should be modified in the interests of all or any portion of the class. The suggestive exercises of the text-book may be extended as thought needful. "Not how much, but how well."

FIFTH-YEAR OUTLINE

The Course for this year is covered by "The Southworth-Stone Arithmetic," Book II, Part I, three-volume edition, or by Book I, Chapter III, two-volume edition.

To save the frequent repetition of titles, page references to the books will show, first the page in the three-volume edition and then that of the two-volume edition. Thus, Page 57; 241 indicates page 57 of the three-volume edition or page 241 of the two-volume edition, the pages being alike.

Expression. Reading and writing Arabic numbers of three integral periods and one decimal period. United States money. The aliquot parts of a dollar (or 100) as common fractions and the reverse.

Suggestions. (1) The equivalent forms of business fractions, as on page 95; 279, should be thoroughly memorized. (General Suggestion 2.)

Integers. I. Terms used in the fundamental operations defined.

II. Oral and written practice in the four operations.

III. Factoring; a pair of factors for any number less than 100; divisibility of numbers (page 103; 287); cancellation; prime factors; greatest common divisor and least common multiple as needed in changing forms of fractions.

IV. Ratio,—a continuation of the comparison of numbers within limits of familiar numbers.

Suggestions. (2) There should be frequent drills in the fundamental operations to maintain and increase what has already been gained in speed and accuracy. Extend the multiplication table.

(3) Factors, greatest common divisor, and least common multiple should be confined to small numbers and ordinarily found by inspection. (See General Suggestion 16.) Cancellation should be taken in connection with the multiplication of fractions.

(4) Comparison of numbers is continued, but under a new name. The power to tell the relation of two quantities instantly should be developed.

Fractions. Addition, subtraction, multiplication, and division of common and decimal fractions with small fractional numbers. Changing fractional units to others, larger or smaller, and to the largest common unit as need therefor arises. Equivalence of familiar decimals (or per cents) with common fractions. Page 95; 279. Comparison of fractions.

Suggestions. (5) Fractions will constitute the special work of the year. The idea of fractions as units and the facility to deal with small business fractions should be cultivated. (General Suggestion 18.)

(6) The least common multiple and the greatest common divisor should be considered when a necessity for their use arises.

Denominate Numbers. Weight, capacity, time, length, surface, and volume measures reviewed and applied. Ratio of one denominate unit to another.

Suggestions. (7) The work may be chiefly in the form of dictated oral exercises, but reviews are essential.

Form and Mensuration. Rectangles, their areas and perimeters; right prisms, their volumes and surfaces.

Suggestions. (8) As in previous grades this subject should be correlated with drawing and construction. It should be subordinated, however, to the special work of the year.

Business Arithmetic. Application of integral and fractional numbers in simple problems, both oral and written. Short methods. Bills.

Suggestions. (9) Many exercises involving the use of the aliquot parts of a dollar and their simpler fractional forms should be dictated.

(10) Exercises in percentage may be given, but the name need not be used nor any allusion to "the three cases" be made. The finding of a part or the whole and their ratio from two given terms is the same whatever the language used. The pupil should not feel that a change of terminology involves a new process.

(11) Commend the discovery of a short method. (General Suggestion 20.)

(12) Let us remember that reviews are essential; that small numbers and business fractions are to be used; that oral exercises must be constant; and that dictating problems and marking papers is not teaching arithmetic.

The work of this year is covered by "The Southworth-Stone Arithmetic," Book II, Part II, three-volume edition, and by Book II, Chapter I, two-volume edition.

Page references will be to identical pages in each edition. Thus page 181; 63 shows page 181 of the three-volume edition, and page 63 of the two-volume edition.

Expression. The decimal system reviewed. Two decimal periods. The identity of common fractions, decimals, and per cents taught; to be used interchangeably. The equation and the statement of problems.

Suggestions. (1) The table on page 179; 61 should be perfectly memorized. (General Suggestion 2.)

Integers. Exercises in the fundamental processes with special attention to rapid addition, using the table on page 133; 15. Multiples and factors. Squares and their roots. Interest by the "Six per cent" or "One dollar" method. Short methods. (See General Suggestions 7 and 20.)

Suggestions. (2) A comparison of attainment in speed and accuracy in the fundamental operations with lower grades will reveal the need of maintaining drill exercises.

Fractions. I. Review exercises and drill in the fundamental operations with fractional numbers.

II. Decimals reviewed, extended, and coördinated with common fractions and percentage.

III. The whole, a part, and the ratio of the part to the whole,—one to be found when the other two are given.

IV. Percentage as fractions under new names applied to commercial transactions and to interest.

Suggestions. (3) As much use may be made of the drill table on page 152 ; 34 as conditions demand. Teachers are expected so to use text-books and courses of study as best to secure results under existing conditions. Special drills will be needed for some pupils, omissions or extensions of work are justifiable for others.

(4) Decimals extended beyond four orders of units are rarely useful. The interchangeable use of common fractions and their decimal equivalents should be constant.

(5) The terms "base," "percentage" and "rate," and "the three cases" need not be used. It is better to speak of "the whole," "a part (or per cent) of it" and their "ratio."

(6) The method of computing interest that is to be used has been found by comparative tests to give the most satisfactory results with pupils of this grade. Interest is a subject that furnishes excellent drill for rapidity and accuracy.

Denominate Numbers. Review of tables; simple oral exercises in changing denominate units. Brief consideration of compound numbers. Difference between dates in connection with interest.

Suggestions. (7) A clear idea of the longer length measures and the larger surface measures should be objectively given. A 75-foot tape line should be accessible. A cord four rods long and graduated to feet, yards, and rods by the use of ribbons of various colors may be prepared. A permanent one-rod line should be painted on the floor, and a square rod set off in one corner of the room. Quarter-mile, half-mile, and mile distances may be established between familiar points, and an acre measured off in a nearby open space. A miniature cord of wood cut to scale and a board foot can be readily had.

Form and Mensuration. Measurement of rectangles, triangles, rectangular solids, lumber, and wood. Ratio of similar surfaces and solids. Correlate with form-study, drawing, and manual work as heretofore,

Business Arithmetic. Application of common and decimal fractions (per cents) in commercial transactions, though not limited thereto. Problems in "gain and loss." Simple interest. Commercial papers prepared and used, — bills, receipts, checks, notes.

Suggestions. (8) As a correlation with language work, original definitions of such terms and descriptions of such processes as have become perfectly familiar may be made orally or in writing. It will be interesting to compare them with those given in the Appendix of the book used.

(9) Pupils will gladly secure sample business papers in variety from their friends.

SEVENTH-YEAR OUTLINE

The work of this year is covered by "The Southworth-Stone Arithmetic," Book III, Part I, three-volume edition, and by Book II, Chapter II, two-volume edition.

Page references will be to identical pages in each edition. Thus page 112; 228 indicates page 112 in the three-volume edition, and page 228 in the two-volume edition.

Expression. A review of decimal notation of integers and fractions with special reference to principles. The use of signs.

Suggestions. (1) The leading object of the brief reviews in this year is to emphasize underlying principles. The maturity of pupils will justify greater attention to explanations and analyses. (General Suggestion 2.)

Integers. Fundamental processes briefly reviewed with special reference to principles and methods. Differentiate between division and partition. Continued drill in rapid combi-

nations and short methods. Application to problems of various kinds. Equations and statements. Ratio. (See General Suggestions 6, 9-11.)

Fractions. Brief review of common and decimal fractions and their various applications. Emphasize principles.

Denominate Numbers. Study of tables as on pages 129, 130; 245, 246. Comparison of foreign and United States money; of weights and of capacity measures. Surface, cubic, and circular measures applied in mensuration.

Suggestions. (2) A supplementary study of the origin and development of our common measures will be found interesting and may be made the subject of a language exercise.

Form and Mensuration. The special work of the year is the measurement of lines, angles, triangles, quadrilaterals, the circle, rectangular solids, the cylinder. Applications in the measurement of surfaces, volumes, land, lumber, etc. Drawing to scale.

Suggestions. (3) The use of objects will of course be necessary. The applications of surface and solid measurements are manifold and varied. While principles should be understood and remembered, it cannot be expected that every application of them shall be exemplified and drilled upon in the limited time available.

Business Arithmetic. Bills, cash accounts; problems in mensuration connected with the business of artisans, land agents, dealers in lumber and wood, etc.; interest.

Suggestions. (4) Problems in mensuration should be made to apply to objects within sight and reach of pupils. They afford an admirable opportunity for the use of equations and cancellation. Pupils will gladly furnish original problems from local conditions.

(5) Problems should frequently be illustrated by drawings made to scale or in perspective. The main purpose, the teaching of arithmetic and not drawing, should, however, be kept in mind. Ten minutes of drawing and two of arithmetic are disproportionate.

EIGHTH-YEAR OUTLINE

The work of this year is covered by "The Southworth-Stone Arithmetic," Book III, Part II, three-volume edition and by Book II, Chapter III, two-volume edition.

Page references will be to identical pages in each edition. Thus page 154; 270 indicates page 154 in the three-volume edition and page 270 in the two-volume edition.

Reviews. There should be frequent practice in the fundamental processes with integers, fractions, and decimals. Rapid computation and short methods. Oral exercises should predominate. (General Suggestion 2.)

Integers. Ratio, proportion; square root.

Fractions. Review of principles; equivalence of business fractions and per cents.

Denominate Numbers. Oral exercises in review; longitude and solar and standard time; leap year. The study of the Metric System is optional.

Form and Mensuration. The right triangle and the Pythagorean theorem; the ratio of similar surfaces. Measurements of surface and volume of prisms and pyramids; cylinders and cones; the sphere; ratio of similar solids. (See General Suggestion 21.)

Business Arithmetic. Percentage and its applications in business will be the special work of the year. The whole, a part, and the ratio of a part to the whole expressed as a fraction or a per cent,—the third element to be found when the other two are given. Commercial discount; insurance; commission; promissory notes; partial payments; bank discount; taxes; government revenues; stocks and bonds; ways of remitting money,—registered letters, money orders, checks, drafts, telegraphic transfers,—exchange. Problems in review of all subjects in the course as on pages 248–279; 364–395.

Suggestions. (1) The review work of the final year of the course is important. At its end, fundamental principles should be thoroughly understood, habits of accuracy fixed, and readiness and speed in ordinary computations attained. Power to state a problem clearly, to choose its best solution, to analyze it logically, and to solve it by the shortest method should have been acquired.

(2) The applications of percentage are difficult to teach only because the transactions are outside of the experience of many of the learners. Subjects should be taught objectively and made realistic as far as possible. Blank forms of commercial papers will be helpful. Price-lists, invoices, receipts, checks, promissory notes, post-office and express money orders, drafts, stock certificates, bonds, coupons, insurance policies, tax bills, etc., may be collected through pupils and should be kept “in stock” among illustrative materials.

(3) The terms *debtor* and *creditor* should be understood and the balancing of accounts may be taught. It is well to explain the functions of savings banks, banks of deposit, and other corporations.

GENERAL SUGGESTIONS

No Course of Study should be inflexible. Local conditions vary the demands and render differences desirable. If the

Course of Study here presented is not exactly adapted to especial needs, it should be changed by variations, omissions, or extensions to suit the demands of the situation. It is believed, however, that as here given it will meet ordinary requirements with little alteration.

Teachers using the "Southworth-Stone Arithmetics" are expected to adapt the use of exercises and problems given to the object to be attained, omitting or supplementing them as deemed advisable.

Let it not be forgotten that it is the *child* that is to be taught and developed rather than the subject. The individual, his temperament, his tastes, his needs, his abilities, must be studied and instruction modified accordingly. Schools exist for the benefit of children, not to exemplify a system or to carry out a policy. Programmes, courses of study, text-books, and the like are only guides and aids. They can never displace nor even trammel wise teachers, through whose judgment, character, and inspiration alone schools attain to the ideal.

THE SOUTHWORTH-STONE ARITHMETICS

MANUAL FOR TEACHERS

SUGGESTIONS FOR THIRD AND FOURTH YEARS

Book I (either edition) pp. 1—184

These Arithmetics are published in two editions, one of three volumes, distinguished as "Book I," "Book II," "Book III," and a two-volume edition entitled "Book I" and "Book II." Book I and the first half of Book II in the three-volume edition make up Book I of the two-volume edition; the latter half of Book II and Book III of the three-volume edition constitute Book II of the two-volume edition. In order to avoid the frequent repetition of titles, when necessary two page-numbers will be used. In such cases the first number refers to the three-volume edition and the second number to the two-volume edition. The first one hundred and eighty-four pages being identical in both editions only a single page-number is needed in referring to them.

This portion of the "Manual" is designed to give assistance to teachers using the books either by way of (1) suggestions as to methods, or (2) by the solution of some problems for illustrative purposes or as an aid in the work of teaching.

A complete list of answers to exercises and problems will be found in the third part of the "Manual."

1. Teachers will observe that throughout the development of the multiplication tables, the child is led to see that multiplication comes from combining equal addends, and that he is shown how to discover products for himself in various ways. These are types of what the teacher may do, and thus, even in the lower grades, encourage the spirit of thought

and investigation. The diagrams as on page 21 may serve to make the necessary drills more interesting.

2. Division, being the inverse of multiplication and arising from it, should be taken up together with or immediately following each of the tables of multiplication. The expressions $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, etc., need not be thought of as fractions, and the notion of $\frac{1}{2}$ or $\frac{1}{3}$ of a single thing should not be developed at this time. $\frac{1}{2}$ or $\frac{1}{3}$ of a number means its division into 2 or 3 equal parts. Objective illustration at the number table will make this plain.

3. Drill tables as on page 36 do not indicate the amount of work needed by a class. This can only be determined by the teacher. The tables suggest a way of giving drills that may be extended at pleasure. By writing a few words, longer or shorter, on the blackboard a new lesson is easily assigned.

4. The development of surface measure and the measurement of oblongs which is begun on page 37 is introduced at this time partly to give concrete examples in multiplication and division. The child should build the oblongs from squares accurately cut from cardboard and also accurately draw them. The way suggested in the text will prevent any such erroneous idea as "inches multiplied by inches give square inches," for the child thinks of the number of square inches in a row and the number of rows.

5. It will be found that the pupil can more easily add orally 90 to 56 than 9 to 56, and hence the drill on page 42 should be practiced upon until results can be given quickly. Then the one on page 65 should follow in the same way. The pupil is then ready to add orally any two numbers of two digits as on page 87. Observe that to add 87 and 46 it is easier to add 40 to 87 and then 6 to the 127.

6. Observe that cubic measure is presented in the same manner as surface measure by the use of concrete objects, the pupil building the right prism with them. The construction of folding boxes that will have a given volume, as suggested on page 80, is interesting and gives a clear notion of cubic measure.

7. The child should see the need, the practical use, of what he learns. Euclid's pupil who asked, "What do I gain by learning all

this?" (geometry) is a type of all. In notation and numeration of large numbers concrete examples, as on page 90 or 110, which show how and when large numbers are needed, are better than purely abstract ones. This is true in all branches of the subject.

8. In teaching the principles of our decimal system bundles of splints or other concrete illustrations should be used. This should also be done in teaching the carrying or "borrowing" process in addition and subtraction.

9. Much use should be made of comparison as begun on page 72 and continued throughout the series. Teach the pupil to look for a simple relation that will save finding the cost or value of one in such problems. If such a relation does not exist then of course the longer way is necessary. (See Stone's "Monograph on the Teaching of Arithmetic," which may be had on application to the publishers.)

10. In teaching multiplication by a number of two digits (page 99) make clear the significance of each partial product. The child should use multipliers ending in a zero as 40, 50, etc., before 46, 57, etc.

11. In beginning the study of fractions the pupil must be led to think of a "fractional unit" as just as real a thing as an "integral unit." Such exercises as on page 134 will aid in this. To give a clear notion of the relation of fractional units to each other such exercises and diagrams as on page 135 are important. Three-fourths should mean to the child 3 *things* that are made by dividing some fundamental unit into 4 equal parts, so that in adding, say $\frac{3}{4}$ and $\frac{1}{4}$, he knows that the 3 and the 5 represent unlike units and that before he can add them he must think them into like units or into $\frac{3}{8}$ and $\frac{1}{8}$. The development in the text should be very closely followed as to order, and supplemented by similar work if need be. The principle, "Only like units can be added," should be made familiar by simple exercises with denominate numbers before the addition of unlike fractions is taken up.

12. Page 162 is intended to suggest a very interesting class of problems that can be made from the quotations of the daily paper.

13. In long division the quotient should be placed above the dividend and each figure in its proper order. This simplifies "pointing off" in

division, as shown on page 174. Until the process has become familiar the ones' digit in the divisor should be small.

It has been found a help to pupils in long division to follow these directions which may be kept upon the board as long as needed: —

- (1) Compare (divisor and partial dividend).
- (2) Divide.
- (3) Multiply.
- (4) Compare (product and partial dividend).
- (5) Subtract.
- (6) Compare (remainder and divisor).

The important point is the comparison of numbers used.

THE SOUTHWORTH-STONE ARITHMETICS

MANUAL FOR TEACHERS

SUGGESTIONS AND SOLUTIONS — FIFTH AND SIXTH YEARS

Book II (Three-Volume Edition)

Book I, Chapter 3, and Book II, Chapter 1 (Two-Volume Edition)

Note. In double-page references the first number refers to the three-volume edition, the second, to the two-volume edition.

(1) The inductive development of subjects in "The Southworth-Stone Arithmetics," and the character of their treatment render comparatively few suggestions necessary. In general, teachers are advised to follow the order of methods in the text-book. This does not necessarily preclude the need or advisability or privilege of modifying or supplementing to meet exceptional conditions.

(2) It will be noticed that while the work of each year begins with notation and numeration and the use of the fundamental processes, the work has been carried farther than in the preceding years. For example, on page 3; 187, a new method of adding by groups is suggested, etc. For these reasons the work, although seemingly simple, should not be omitted, for points are made which could not be presented in preceding grades.

(3) While the work in fractions, beginning on page 15; 199, presupposes the work of preceding years it is made very simple. The first aim in fractions should be to get by concrete illustrations the correct notion of a fractional unit and a fractional number. In learning the relation of fractional units the child should have concrete illustrations as on page 40; 224. The pupil must have sufficient work in such comparisons and not juggle with numerator and denominator by some rule. Having obtained a clear idea of the relation of fractional units the pupil will have no trouble in the

fundamental operations. The order of the book should be closely followed and supplementary work of the same kind given when necessary. Make use of the expression, "change to a common unit," rather than the less direct one, "reduce to a common denominator." The child has had the principle firmly fixed that "*only like units can be added*," hence the first of the above expressions will mean something to him. Do not be in haste to get into the fundamental operations but let the child grow into a full understanding of a fraction by the method of the text.

(4) Solve such problems as those given on page 31; 215, by having the pupil see the relation of what is wanted to what is given. For example, let the solution of the 3d be:—

WORK 3) \$3240 \$1080	If an explanation is required, as it may be in written work, let it be somewhat as follows:— Since I know the cost of 21 acres and want to know the cost of 7 acres, I divide the cost of 21 acres, or \$3240, by 3 for 7 is $\frac{1}{3}$ of 21.
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(5) Observe the way percentage is first introduced on page 86; 270. Let the pupil see that it suggests a convenient way of writing *hundredths*. Observe that no new principles arise, but merely a new notation. Do not make use of such text-book terms as *rate*, *base*, and *percentage*, but rather have the pupil see that he is (1) to find a part of a number just as with any other fraction, (2) to find all when a part is given, or (3) to find the relation between two numbers expressed in hundredths.

(6) When a per cent can be expressed as a fraction with a larger unit, as $50\% = \frac{1}{2}$, $25\% = \frac{1}{4}$, $12\frac{1}{2}\% = \frac{1}{8}$, etc., such a change should be made before the work is done. See pages 91, 97; 275, 281, etc.

(7) The aliquot parts of a dollar should be learned and used when it will facilitate computation. See pages 95, 96; 279, 280, etc.

(8) Observe the development of cubic measure and the measure of a right prism on pages 105, 106; 289, 290, etc. In this way the pupil will see in a right prism 3 in. by 4 in. by 5 in., $3 \times 4 \times 5$ cu. in., for there are 5 cubes in one row, 4 rows in one layer, and 3 layers in the solid. Do not allow the incorrect form 3 in. \times 4 in. \times 5 in. = 60 cu. in., sometimes seen.

(9) Observe that the "oral reviews" of fractions at the beginning of the Sixth-Year work, pages 135-137; 17-19, and the written and oral exercises to page 152; 34, give the pupil a much deeper insight into the principles of fractions than he was able to gain in earlier presentations of the subject.

(10) Observe that the order of considering rectilinear areas is first the rectangle and then the triangle, rather than rectangle, parallelogram, trapezoid, and triangle. Observe that when the child can measure a rectangle he can cut any rectilinear plane figure into rectangles and find its area, and that when he can measure the triangle he can measure any rectilinear plane figure.

(11) The problems designed for Fifth- and Sixth-Year work have intentionally been made simple and are easily solved. Hence the solutions of only a few are given in these pages, merely to suggest methods. Answers to all problems and exercises will be found elsewhere in this "Manual."

Page 204 ; 86

2. (1) Each lot has the same width, 40 feet, but the second is $1\frac{1}{2}$ times as long as the first; (2) therefore it cost $\$800 + \frac{1}{2}$ of $\$800 = \1200 .

4. (1) The whole garden contains 50×120 sq. ft. (2) The bed of peas contains 20×30 sq. ft. (3) Therefore the ratio required is $\frac{600}{6000}$ or $\frac{1}{10}$. (4) $\frac{1}{10} = \frac{10}{100} = 10\%$.

6. (1) There are two parts to the roof, each 16 ft. by 40 ft., and each square foot requires 9 shingles. (2) Therefore there will be required $2 \times 16 \times 40 \times 9$ shingles or 11,520.

8. (1) Since 11,520 is equal to 11.52 thousand, the cost is $11.52 \times \$4.25 = \48.96 .

Page 205; 87

12. $(3000 - 40) \div 2 = 1480$, length of each square lot in feet.
 $(1480 \times 1480) \div (160 \times 272\frac{1}{4}) = 50 \frac{319}{1088}$, no. of acres.

It is well for pupils to learn that there are 43560 sq. ft. in an acre. See page 130; 246.

Page 207; 89

Other such exercises, as those on page 207; 89, may well be given.

3. The largest is 8 by 16 rods. It contains 128 sq. rods.
4. The smallest is 6 by 2 rods.
5. This can be cut into 4 rectangles as follows: 3 by 13; 2 by 4; 3 by 4; 14 by 15. Find other ways.

Page 215; 97

5. Since a cubic foot will make 8 six-inch cubes (draw diagram), one will weigh $\frac{1}{8}$ of 165 lbs. or $20\frac{3}{8}$ lbs.

6. Express dimensions in yards; then $\frac{3}{4} \times 4 \times 6$ cu. yds. = 64 cu. yds.

8. $3 \times 4 \times 6 \times 0.8$ bu. = 57.6 bu.

9. Since a 6-inch cube is 8 times as large in volume as a 3-inch cube, the 6-inch cube will weigh 8×8 lbs. or 64 lbs.

12. Express dimensions in feet, since the answer is required in cubic feet. $\frac{1}{8} \times 66 \times 99$ cu. ft. = 1089 cu. ft.

13. Compare a cellar $8 \times 15 \times 18$ with one $8 \times 15 \times 12$, and it is seen that the cost of the required one is $1\frac{1}{2}$ times the other, or \$75. Cancellation may be used.

15. Express dimensions in yards. $220 \times \frac{3}{4} \times \frac{1}{2}$ cu. yds. $= 73\frac{1}{2}$ cu. yds.

16. 500 tons will contain 165 lbs. 6060 $\frac{3}{8}$ times; hence this is the number of cu. ft.

Page 217; 99

1. Area of bottom $= 13 \times 8$ sq. ft. $+ 5 \times 10$ sq. ft. $+ 28 \times 22$ sq. ft. $= 770$ sq. ft. $770 \times 27\phi = \$207.90$.

2. Since 770 cu. ft. will be removed from a layer 1 ft. thick there will be 8×770 cu. ft. or 6160 cu. ft. or 228 cu. yds. and 4 cu. ft. removed.

4. (1) Total perimeter $= (35 + 35 + 28 + 28)$ ft. or 126 ft.
(2) $8 \times 126 \times 38\phi = \388.04 .

5. (1) Length of partitions $(13 + 10)$ ft. or 23 ft. (2) Area $= 8 \times 23$ sq. ft. $= 184$ sq. ft.
(3) $184 \times 26\phi = \$47.84$.

6. Area $= 8 \times 20$ sq. ft. $+ 16 \times 16$ sq. ft. $= 416$ sq. ft.

8. Since a layer 1 ft. thick will contain 416 sq. ft. there will be as many 1-foot layers as $3328 \div 416$ or 8; hence the depth is 8 ft.

9. (1) Perimeter $= (24 + 24 + 20 + 20)$ ft. $= 88$ ft.
(2) 8×88 sq. ft. $= 704$ sq. ft.

Page 225; 107

12. In this problem if an oral comparison of $\frac{3}{4}$ to $\frac{5}{8}$ can be made, i. e., $\frac{3}{4}$ to $\frac{3}{4}$, observe that what is wanted is $\frac{1}{10}$ of what is given

less than what is given; hence the solution is $\$3755 \times \$375.50 \times \$3,379.50$. If a class is trained to look for such relations rather than use unitary analysis time may be saved and interest aroused.

Page 226; 108

5. The cost of 2000 is wanted. The cost of 1500 is given. Hence we want the cost of 500 lbs. more than is given; hence the solution is $\$6 + \frac{1}{3}$ of $\$6 \times \8 . This method is better than finding the cost of 1 lb. and then of 2000 lbs.

Page 227; 109

9. I lose \$20 on \$120 invested or $\frac{1}{6}$ of my investment. $\frac{1}{6} = 16\frac{2}{3}\%$.

10. \$30 gained on \$120 invested is a gain of $\frac{1}{4}$ of the investment or 25%.

11. When I sell 3 I get the cost of 4, or I gain 1 on every 3 or $\frac{1}{3}$ or 33 $\frac{1}{3}\%$.

Page 230; 112

3. (1) $16\frac{2}{3}\% - 12\frac{1}{2}\% \times 4\frac{1}{8}\%$. (2) All, or 100%, of anything is 24 times $4\frac{1}{8}\%$ of it. (3) Hence $24 \times \$12\frac{1}{2}$ or \$300 is all.

6. All the cost is 12 times $8\frac{1}{3}\%$ of it. Hence the cost was $12 \times \$200$ or \$2400, and the selling price $\$2400 - \200 or \$2200.

Page 233; 115

14. (1) $59,500 - 57,000 \times 2,500$ or $2\frac{1}{2}$ thousand cu. ft. used.

(2) $2\frac{1}{2} \times \$1.40 \times \3.50 .

15. $\$2.75 \div \$1.25 \times 2\frac{1}{2}$ times; hence $2\frac{1}{2}$ thousand or 2,200 cu. ft. were used. $59,500 \div 2,200 \times 61,700$, the reading Sept. 1.

Page 234; 116

1. 2 yrs. 6 mos. is $3\frac{3}{4}$ times 8 mos. hence the interest for 2 yrs. 6 mos. should be $3\frac{3}{4} \times \$128$ or \$480.

3. A piece 6 rds. square contains 36 sq. rds.
[160 — (36 + 6)] sq. rds. \times 118 sq. rds.

6. (1) 20% discount from \$2.50 = a net cost of \$2 per 1000.

(2) 4300 cu. ft. \times 4.3 thousand. (3) $4.3 \times \$2 \times \8.60 .

10. \$2.40 per crate of 2 doz. is 10¢ per can; a gain of 5¢ on 10¢ invested is $\frac{1}{2}$ or 50%.

THE SOUTHWORTH-STONE ARITHMETICS

MANUAL FOR TEACHERS

SUGGESTIONS AND SOLUTIONS

Book III (Three-Volume Edition) or Book II (Two-Volume Edition)

Note. In double-page references the first number refers to the three-volume edition, the second to the two-volume edition.

1. The first part of Book III or Chap. 2 of Book II (two-volume edition) gives a final review of the general principles of our system of notation and the fundamental processes. Notice that principles are given here that could not have been given earlier in the course. The *place value* feature of our notation is more clearly seen; the pupil gets a clearer notion of a *unit* in mathematics, page 4; 120; sees on page 5; 121 that a decimal fraction is an extension of our notation to the right of *ones'* place; sees on page 8; 124 the fundamental principle of addition; and thus throughout the first 80 pages the pupil is to get his final idea of the fundamental principles of arithmetic, and hence it is important that this work be carefully taken.

2. Call attention to such problems as 3-10 on page 19; 135. Have pupils look for combinations that will save work. Notice a similar class on page 22; 138.

3. Have pupils discover such short processes as those on page 27; 143. Give such work frequently until the methods are so fixed that they will be naturally used whenever an opportunity affords.

4. Too much emphasis cannot be laid on the careful study of a problem before any attempt at solution is made. "Well understood is half done." Such study should enable the student to make a

fairly correct approximation to the answer, — to judge what a reasonable result should be. Attention is called again to the method on

Page 31; 147.

7. Compare what is wanted or the cost of 10 lbs. with what is given or 14 lbs. (1) 10 is $\frac{5}{7}$ of 14. (2) Hence the cost of 10 lbs. is

$$\frac{\begin{array}{r} \$0.42 \\ 5 \times \$2.94 \\ \hline 7 \end{array}}{\quad} = \$2.10$$

8. Since 51 is 3 times 17, 51 tons will cost 3 times as much as 17, and the work to be done is $3 \times \$134 = \402 .

Page 32; 148

(Since the analysis is simple only the work to be done is written.)

1. $(7 \times \$125 - 3 \times \$85) - \$1000 = \130 gain.
2. $\$5000 + 50 \times \$15 = \$5750$.
3. $3\frac{1}{8} + 3\frac{1}{8} = 8$, the number of hours.
4. $1\frac{1}{8} \times 90$ ds. = 225 ds.
5. $2\frac{1}{4} \times \$35 = \$35 + \frac{1}{2}$ of $\$35 = \52.50 .
6. 280 m. $\div \left(11 - \frac{7 \times 3 + 39}{60}\right) = 28$ m.
9. $3 \times 25¢ - (3 \times 16 \times 1¢ + 3 \times 8¢) = 3¢$ cheaper by post.
10. $2 \times \left(\frac{8 + 2 \times 32 + 5}{7}\right) = 22$.
11. $4485 \div (75 + 40) = 39$.

Page 34; 150

2. $\frac{34}{\cancel{2114}} \times 2 \text{ tons} = 68 \text{ tons.}$
4. $\frac{5}{4} \times \frac{11}{4} \times \$5.28 = \$2.25 \text{ (Cancel).}$
5. $\frac{7400 - 5600}{1000} \times \$1.25 = \$2.25.$

Page 36; 152

Note. In these problems the pupil is supposed to compare what is wanted with what is given and discover the ratio without a pencil, then write down the work to be done as follows:

2. $3 \times \$7.50 = \$22.50.$ 4. $5 \times \$18.70 = \$93.50.$
6. $6 \times \$72 = \$432.$ 8. $\frac{1}{4} \times 42 \text{ da.} = 6 \text{ da.}$
9. $7 \times \$175 = \$1225.$ 10. $5 \times 325 \text{ bu.} = 1625 \text{ bu.}$
11. $6 \times 342 = 2052.$
12. $3 \times (8 \times \$\frac{5}{8} - \$4.50) = \$1.50 \text{ gain.}$
16. $\frac{3}{4} \times \$12.50 = 4 \times \$12.50 + \frac{1}{2} \text{ of } \$12.50 = \$56.25.$

Page 40; 156

1. $44 \times (\$5.60 - \$5.25) = \$15.40.$
7. $\frac{2 \times (600 + 413)}{16\frac{1}{2}} \times \$1.25 = \$153.48.$
11. $\frac{1056}{4} \times 30 \text{ ft.} = 7920 \text{ ft.}$

Page 48; 164

The *least common multiple* is not needed until we are obliged to change fractions to common units in which the numbers are such that it cannot readily be done by inspection. Lead the pupil

to see the need of such a process and use a simple method as on pages 48; 164.

Page 51; 167

Observe the "model solution" in multiplying by a mixed number. Multiply first by the numerator of the fraction then divide the product by the denominator.

Page 52; 168

1. (1) $\frac{1}{2} + \frac{2}{3} + \frac{1}{4} = \frac{4}{6}$. (2) Since $\frac{4}{6}$ of a number is 110 all of it, or $\frac{3}{2}$ of it, must be $\frac{3}{2}$ of 110 or 84.

4. (1) $\frac{4}{3} + \frac{2}{3} = \frac{6}{3}$, the part underground and roofed in. (2) $\frac{3}{3} - \frac{1}{3} = \frac{2}{3}$, the part exposed. (3) $\frac{1}{3}$ of 132 = 68, the number of courses exposed.

7. (1) $\frac{1}{4} + \frac{5}{12} + \frac{2}{3} = \frac{3}{2}$ or $\frac{3}{2}$. (2) Therefore $\frac{1}{2}$ is left for the fourth man to cut. (3) $\frac{1}{2}$ of 11A. = $1\frac{1}{2}$ A.

Page 54; 170

1. \$29.39 2. \$16.76 3. \$69.65 4. \$3.63

5. $12\frac{1}{2}\text{¢} = \$\frac{1}{8}$. $42 \times \$\frac{1}{8} = \5.25 .

$\$5.25 - \$3.50 = \$1.75$ gain. $\$1.75 = \frac{1}{2}$ of $\$3.50$, therefore the gain is $\frac{1}{2}$ of the cost.

6. Since 3 cost 5¢, 1 doz. cost 20¢, and 9 doz. cost \$1.80. Since 1 in 12 is worthless 11 of each dozen or 99 oranges were sold at 4 for 9¢. Then 99 sold for $\frac{9}{4} \times 9\text{¢} = \2.23 . $\$2.23 - \$1.80 = 43\text{¢}$ gained.

7. (1) \$1.60 per gross is $1\frac{1}{4}\%$ of \$1.60 per 100, or \$1.11 $\frac{1}{4}$.

(2) $\$1.25 - \$1.11\frac{1}{4} = 13\frac{3}{4}\text{¢}$ \therefore \$1.60 per gross is 13 $\frac{3}{4}\text{¢}$ per hundred better.

8. $\frac{7}{8} \times \$16.71 = \$38.99.$

9. $8\frac{1}{2}\%$.

Make such use of the drill table page 58; 174 as the necessities of the class demand. It serves for oral as well as written exercises.

Page 59; 175

1. (1) Since he loses $\frac{3}{8}$ of his share he keeps $\frac{5}{8}$ of it.

(2) $\frac{5}{8}$ of $\frac{4}{5} = \frac{2}{5}$, the part kept.

3. (1) $68\text{ T} = 8 \text{ times } 8\frac{1}{2}\text{ T.}$ (2) $\therefore \text{cost of } 68\text{ T} = 8 \times \$48\frac{1}{2} = \$391.$

4. (1) Rent for 1 year $= 12 \times \$43\frac{1}{3} = \$520.$ (2) Taxes $= \$75.$
(3) $\$520 - \$75 = \$445$, net income.

7. (1) Since the whole cost is $\frac{7}{8}$ of $\frac{1}{2}$ of it,

(2) Cost $= \frac{7}{8} \times \$285 = \$375.$

8. $\frac{3}{4} \times \frac{2}{3} \times \$20 = \$6.$

11. (1) $3\frac{1}{2}$ or $1\frac{1}{4}$ hrs. is $\frac{3}{4}$ of $2\frac{1}{2}$. (2) $\frac{3}{4}$ of 240 m. $= 160$ m.

12. (1) $\frac{3}{5} \times \frac{2}{3} = \frac{2}{5}$ drawn off.

(2) $\frac{2}{5} + \frac{2}{5} = \frac{4}{5}$, the part to fill.

(3) $\frac{4}{5}$ of 168 $= 127\frac{1}{5}$.

13. (1) From 10.45 A.M. to 3.20 P.M. $= 4\frac{7}{12}$ hrs. or $4\frac{1}{2}$ hrs.

(2) $64\frac{1}{2} \text{ m.} \div \frac{4}{5} = \frac{12}{55} \times \frac{257}{4} \text{ m.} = 14\frac{1}{5} \text{ m. per hour.}$

Page 60; 176

1. $\frac{5}{8}$ of $\frac{1}{2}$ of $\frac{3}{4}$ of $\frac{2}{3} = \frac{1}{8}.$

4. (1) The relation of 46 to $13\frac{1}{2}$ is $\frac{46}{13\frac{1}{2}}$ or $\frac{230}{69}$.

(2) $\frac{230}{\frac{69}{23}} \times 3 \text{ bbl.} = 10 \text{ bbl.}$

5. (1) $\frac{2}{3} + \frac{2}{3} = \frac{4}{3}$, the part traveled, $\therefore \frac{4}{3} =$ part to travel.

(2) The ratio of what is wanted to what is known, or $\frac{4}{3}$ to $\frac{6}{5}$ is $\frac{20}{9}$. (3) $\therefore \frac{20}{9} \times 660 \text{ m.} = 3190 \text{ m.,}$ the distance traveled.

9. $37\frac{1}{2} \times (\$11.75 \div 13\frac{1}{2}) = \frac{202}{2} \times \frac{2}{11} \times \$11.75 = \$32.56.$

Pages 62 and 63; 178 and 179

It is important that the pupil make such comparisons as suggested on these pages. In Ex. 30, page 64; 178, the pupil should see that 200 bu. is $\frac{2}{3}$ of the crop, and all the crop, or $\frac{3}{2}$ of it, is $\frac{3}{2}$ of this which is $200 + \frac{1}{2}$ of 200 or 250.

In problems like Ex. 5, page 63; 179, the pupil should see that the whole crop is 2 times 50% of it or $2 \times 400 \text{ bu.}$ or 800 bu.

Page 66; 182

2. $\frac{1}{4}$ of $\frac{1}{3} + \frac{1}{3}$ of $\frac{1}{3} + \frac{1}{3} = \frac{1}{3}\frac{2}{3}$.

6. $\frac{22 \times 18}{5280} = \frac{3}{40}$ (use cancellation).

9. A thousand 56-lb. bu. is $\frac{3}{8}$ or $\frac{1}{4}$ of a thousand 60-lb. bu.

11. $25 \times \frac{7}{\frac{12}{3}} \times \frac{20}{\$80} = \$1166\frac{2}{3}.$

Page 70; 186

2. (1) $12\frac{1}{2}$ for 2 qts. is $16 \times \frac{1}{2}$ or \$2.00 per bushel.

(2) $3.25 \times \$2 = \$6.50.$

$$6. \frac{13}{13\frac{3}{4}} = \frac{13 \times 4}{13\frac{3}{4} \times 4} = \frac{52}{55} \quad 7. \frac{46}{115 + 46} = \frac{46}{161} = \frac{2}{7}.$$

9. (1) $\frac{3}{4}$ of $\frac{3}{4} = \frac{3}{16}$, the part sold.

(2) Since $\frac{3}{16}$ is sold for \$30, $\frac{1}{8}$ or all should sell for $\frac{1}{3} \times$
\$30 or \$100.

11. (1) The relation of all or $\frac{1}{5}$ to $\frac{2}{5}$ is $\frac{1}{2}$.

(2) $\therefore \frac{1}{2} \times \frac{1}{2}$ ds. = the time required, $4\frac{1}{2}$ ds.

12. $\frac{1}{3} - \frac{1}{12} = \frac{1}{4} - \frac{1}{4} = \frac{1}{4}$; \therefore the difference or $\frac{1}{4}$ is \$75;
one bid $\frac{1}{3}$ of \$75 = \$276.92, and the other bid $\frac{1}{4}$ of \$75 = \$201.92.

Page 81; 197

1. (1) $100\% - (26\% + 32\% + 21\%) = 21\%$ in the 4th ward.

26% of 40,000 = 10400; 32% of 40,000 = 12800;

21% of 40,000 = 8400; 21% of 40,000 = 8400.

2. $\frac{\$48.30}{21\% \text{ of } 200} = \1.15 ; $\$1.15 + 20\% \text{ of } \$1.15 = \$1.38$.

3. $\frac{1}{4} \times \$54.60 \div 390 = \1 .

10. (1) Since two receive a double portion, there are in all 9 shares equal to those of the 5 that share equally.

(2) 2% of $(\$81,271.80 \div 9) = \180.60 .

Page 91; 207

11. $\frac{1}{3}$ of $(10\frac{1}{2} \times \frac{2}{3} \text{ of } 10\frac{1}{2}) = \frac{1}{3} \times 2\frac{1}{2} \times \frac{2}{3} \times 2\frac{1}{2} = 8\frac{1}{6}$, the no. of yards.

12. There are 27 strips and 27 squares in a strip, hence 729 squares.

15. $\frac{40 \times 18}{9} \times \$2.25 = \$180$.

16. $\frac{600 \times \frac{2}{3} \times 600}{16\frac{1}{2} \times 16\frac{1}{2} \times 160} = 5\frac{1}{3}\frac{2}{3}$, the no. of acres.

17. (1) $\frac{1}{2}$ mile = 880 yds.
 (2) 60 ft. = 20 yds.
 (3) $20 \times 880 \times 36 = 633,600$.

18. $\frac{1}{2} \times \frac{2}{3} \times \frac{2}{3} \times \frac{1}{2} = 80\text{¢}$.

20. (1) Since 10 yds. were $\frac{2}{3}$ yd. wide, and the remaining 10 yds. 1 yd. wide, the cost is

(2) $(10 \times \frac{2}{3} + 10) 75\text{¢} = \$7.50 + \$7.50 + \frac{1}{3} \text{ of } \$7.50 = \$17.50$.

Page 92; 208

8. (1) No. of strips, 5. (2) No. of yds. in a strip, 6. (3) Waste, $1\frac{1}{2}$ yds. (4) Total, $31\frac{1}{2}$ yds. (5) $31\frac{1}{2} \times 90\text{¢} = \28.35 .

9. (1) No. of strips, 8. (2) No. of yds. in strip, $7\frac{1}{3}$. (3) Waste, $2\frac{1}{4}$ yds. (4) Total, $58\frac{2}{3} + 2\frac{1}{4} = 60\frac{1}{12}$ (5) $60\frac{1}{12} \times \$4.25 = \258.90 .

10. (1) No. of strips, 5. (2) No. of yds. in strip, $5\frac{1}{2}$. (3) Waste, $\frac{7}{8}$ yd. (4) Total, $27\frac{1}{2} + \frac{7}{8} = 28\frac{3}{8}$ yds. (5) $28\frac{3}{8} \times \$0.87\frac{1}{2} = \24.83 .

11. (1) $9 \times 7\frac{1}{2}$ yds. + $2\frac{3}{4}$ yds. = $66\frac{1}{2}$ yds. (2) $66\frac{1}{2} \times \$1.37\frac{1}{2} = \90.92 .

Page 93; 209

1. Upper figure = a rectangle 3' 4" by 10", one 3' 8" by 10", and one 3' 4" by 10". The lower figure = one rectangle 6' by 2' and two each 1' 2" by 4". Total, $21\frac{7}{8}$ sq. ft.

2. (1) 36 2-inch tiles will cover 1 sq. ft. (2) \therefore the number required is $21\frac{7}{8} \times 36$ tiles or 770 tiles.

3. (1) 1 roll = 4 sq. yds.
 (2) $(2 \times 13\frac{1}{2} + 2 \times 18) \times 8 \div 9 = 56$ sq. yds. in walls.
 (3) 56 sq. yds. $\div 4$ sq. yds. = 14, the number of rolls, answer.
 (4) $(18 \times 13\frac{1}{2}) \div 9 = 27$ sq. yds., area of ceiling.
 (5) 27 sq. yds. $\div 4$ sq. yds. = $6\frac{3}{4}$, no. of rolls for ceiling; 14 rolls + $6\frac{3}{4}$ rolls = $20\frac{3}{4}$ rolls. Answer, if ceiling is papered.
4. (1) $\frac{8 \times 6}{144} = \frac{1}{3}$, the part of a sq. ft. covered by one slate.
 (2) 950 = the no. of sq. ft. in the roof. (3) $\therefore 3 \times 950$ or 2850 = the no. of slates required.
5. (1) It will require $2 \times 16\frac{1}{2} \times 4$ or 132 blocks one way,
 (2) and $3 \times 16\frac{1}{2} \times 4$ or 198 the other; (3) $\therefore 132 \times 198$ or 26,136 is the total number.
6. If folded $\frac{1}{2}$ -inch on each side, each sheet will cover 12 by 18 in., hence it will take 10 rows and 7 ($6\frac{3}{4}$) in a row or 70.
7. $(30 \times 8 + 24 \times 7 + 7\frac{1}{2} \times 12\frac{3}{4}) - 500 = 1\frac{1}{2}$ sq. ft.
10. $10 \times 14 + 24 \times 8 + 16 \times 4 + 10 \times 20 + 4 \times 12 = 644$, the number of sq. ft. or $71\frac{1}{5}$ sq. yds.

Page 95; 211

1. (1) Width = $144 + 16 + 50 + 60 + 75 = 345$ ft.
 (2) Length = $150 + 64 + 74.25 + 67.75 + 40 = 396$.
 (3) Cost = $345 \times 396 \times 3¢ = \4098.60 .
2. (1) 40×150 sq. ft. = 6000 sq. ft. (2) $6000 \times 5¢ = \$300$.
3. (1) $\frac{40 \times 345}{16\frac{1}{2} \times 16\frac{1}{2}} \times \$3.75 = \$190.08$.
 (2) $40 \times 345 \times 3¢ = \414 .
 (3) $\$414 + \$190.08 = \$604.08$.

Page 96; 212

4. $150 \times 50 \times \$\frac{1}{2} = \$937.50.$
5. $150 \times 60 \times 15¢ = \$1350.$
6. $150 \times 75 \times 22\frac{3}{4}¢ = \$2559.38.$
7. $144 \times 64 \times 18\frac{3}{4}¢ = \$1728.$
8. $144 \times 74.25 \times 21¢ = \$2245.32.$
9. $144 \times 67.75 \times 20\frac{1}{4}¢ = \$1975.59.$
10. $135 \times 55 \times 19\frac{1}{2}¢ = \$1447.88.$
11. (1) $135 - 39 = 96$, the length of K and L.
(2) $96 \times 55 \times 17\frac{3}{4}¢ = \$937.20.$
12. $80 \times 96 \times 25\frac{1}{8}¢ = \$1929.60.$
13. (1) $(16 \times 185 + 16 \times 206)$ sq. ft. @ $3¢ = \$187.68.$
(2) $\$187.68 + \$85 = \$272.68.$
14. (1) $150 + 128 = 278$, the length to be covered with brick.
(2) $4\frac{1}{2}$ brick = the number to cover 1 sq. ft.
(3) $278 \times 8 \times 4\frac{1}{2} \times \$0.012 = \$120.10$, cost of brick.
(4) $158\frac{3}{4} + 128 =$ the length of the 8-in. edgestones.
(5) $286\frac{3}{4} \times 60¢ = \172 , the cost of edgestones.
(6) $\$58.25 + \$120.10 + \$172 = \350.35 , the total cost.
15. (1) Length of side and end = $135 + 55 = 190.$
(2) Length of division fence = 190.
(3) $\frac{1}{2}$ of 190 = 95, the part of division fence paid for by the owner of lot J.
(4) $190 + 95 = 285.$
(5) $\frac{285}{16\frac{1}{2}} = \$3.30 = \$57.$

Page 96; 212

16. (1) Length of alley = 190 ft. + 201 ft = 391 ft.
 (2) $\frac{16}{3} \times \frac{391}{3} = 672\frac{2}{3}$, the number of sq. yds. or,
 (3) $\frac{16}{3} \times \frac{391}{3} \times \frac{225}{4} \text{¢} = \391 , the cost.
17. (1) Total frontage to the alley = 201 + 206 + 190 + 185 = 782 ft.
 (2) Since 782 ft. cost \$391, the cost was 50¢ per ft.
 (3) Since J has 135 ft. to the alley, his part is \$67.50.
18. (1) The owner of I should pay for 190 + 50 + $\frac{1}{4}$ of 32 or 248 ft.
 (2) 248 ft. @ 50¢ = \$124.
 (Note $\frac{1}{4}$ of 32 comes from $\frac{1}{4}$ of the corner. Draw a diagram.)
19. (1) $\frac{1}{4}$ of $\frac{40}{3} \times \frac{345}{3} \times \$3 = \$1150$, the total cost to all abutters.
 (2) Since L has 96 ft. frontage, it should pay $\frac{96}{345}$ of all.
 (3) $\frac{96}{345} \times \$1150 = \320 .
20. (1) Total length of walk = $2 \times 372 + 2 \times 345 = 1434$.
 (2) $\frac{1434}{3} \times \frac{8}{3} \times \$1.25 = \$1593.33$.
21. (1) Perimeter of lot I = $2 \times (89 + 190) = 558$ ft.
 (2) $558 \times \frac{2}{33} \times \$1.25 = \$42.27$.

Page 99 ; 215

15. This is equivalent to two triangles with base 24 and altitudes 18 and 15. Hence the area is

$$\frac{1}{2} \text{ of } [(18 + 15) \times 24] = 396, \text{ the number of square inches.}$$

16. This is equal to two triangles, each with base of 150 feet, and the sum of the altitudes is 100 ft. Hence the whole area is

$$\frac{1}{2} \text{ of } 100 \times 150 \text{ sq. ft.} = 7500 \text{ sq. ft.}$$

19. $\frac{1}{2}$ of $[(6 + 8) \times 14] = 98$, the number of sq. in.

Page 101 ; 217

3. $\frac{2}{3}$ of $2 \times 2 = 2\frac{2}{3}$, the number of sq. ft.

5. $\frac{1}{2}$ of $(25 + 37) \times 15 = 465$, the number of sq. in.

7. $\frac{1}{2}$ of $(165 + 80) \times 50 \times 45¢ = \2756.25 .

8. $\frac{1}{2}$ of $\frac{600 \times 300}{272\frac{1}{4}} = 330\frac{79}{121}$, the number of sq. rds.

9. The rhombus has an area of 12×16 ; the square has an area of 16×16 ; therefore the rhombus is $\frac{1}{2}$ or $\frac{3}{4}$ of the square.

10. $\frac{1}{2}$ of $(16 + 18) \times 42 = 714$, the number of sq. m.

16. A triangle is $\frac{1}{2}$ of a square of same dimensions. Hence the area is $\frac{1}{2}$ of 10×10 sq. rds. or 50 sq. rds.

17. $\frac{3 \times 36 \times 4}{20} \times 3\frac{1}{2}¢ + 12 \times 15¢ = \2.56 .

Page 103 ; 219

In developing the area of a circle do not make the mistake of calling the sectors triangles. See section 4 on page 104; 220.

Page 105; 221

Observe the "note" under Ex. 5, page 104; 220.

14. A 4-ft. round table has an area of 3.1416×2^2 ; a 4-ft. square table has an area of 16 sq. ft.; hence the round one is $\frac{3.1416 \times 2^2}{16}$ or 0.7854 of the square one.

Page 108; 224

Observe the value of statements before solutions and of cancellation and short methods on this page.

1. $4.7124 \div 3.1416 = 1.5$ in., the length of the button-hole.

6. Each straight edge $= \frac{1}{2}$ the diameter. The curved edge $= \frac{1}{8}$ of $\pi \times$ diameter. $\frac{\pi}{6} \times D \div \frac{D}{2} = \frac{\pi}{6} \times D \times \frac{2}{D} = \frac{\pi}{3} = 1.0472$, ratio of curved edge to straight edge.

7. The spokes of one are 3 inches longer than those of the other. Therefore the diameter is 6 inches greater and the larger wheel is 6×3.1416 inches, or 18.8496 inches larger in circumference.

8. $100 \times (8 \times 3.1416 + 3)$ inches $= 2813.28$ inches or 234.44 ft.

9. Greensward $= 100 \times 100 - 3.1416 \times 100 = 9685.84$, the number of square feet.

10. $\frac{1}{4}$ of $(3.1416 \times 6^2 - \frac{1}{2} \text{ of } 12^2) = 10.2744$, the no. of sq. in.

12. $3.1416 \times (19\frac{1}{2})^2 - 3.1416 \times (16\frac{1}{2})^2 = 3.1416 \times 108 = 339.2928$, the no. of sq. ft.

13. $\frac{3.1416 \times 8^2 - 3.1416 \times 5^2}{3.1416 \times 8^2} = 60\frac{1}{8}\%$.

Page 113; 229

8. A joist 4 in. square will make 4 one-inch boards or the same as a 16-inch board. 12 16-inch boards, 16 ft. long, contain

$$12 \times 1\frac{1}{2} \times 16 \text{ bd. ft. or } 256 \text{ bd. ft.}$$

9. A "3 × 4" will make a "12 by 1"; 8 boards, 12 ft. long and a foot wide, = 96 bd. ft.

Page 113; 229

10. $6 \times 16 \times 1\frac{1}{4} \times \frac{1}{8} = 140$, the no. of bd. ft.

11. $15 \times 18 = 270$, the no. of bd. ft.

12. $18 \times 12 = 216$, the no. of bd. ft.

13. $12 \times \frac{(6 + 10)}{2} \times \frac{1}{1\frac{1}{2}} = 8$, the no. of bd. ft.

Page 115; 231

In developing the measurement of a cylinder observe Section 7.

Page 116; 232

10. $10 \times 3.1416 \times 4^2 = 502.656$, the no. of cu. ft.

11. $\frac{1728}{231} \times 8 \times 3.1416 \times 2^2 = 752.0256$, the no. of gal.

12. $32 \times 3.1416 \times (\frac{1}{2})^2 = 628.32$, the no. of cu. ft.

13. $231 \div 33 = 7$, the no. of inches in depth.

Page 117; 233

1. $16 \times 24 - 3.1416 \times 8^2 = 182.9876$, no. of sq. in. remaining.

2. $\frac{3.1416 \times 4^2}{9} \times \$2.50 = \$13.96$.

3. $5280 \div (6 \times 3.1416) = 280.1$, the no. of revolutions.

4. $7 \times 5 \times 3.1416 = 109.956$, the no. of sq. ft.

Page 118: 234

13. $\frac{\$2.70}{30\text{¢}} = 9$, the no. of bd. ft. in the board.

Since the board was 12 ft. long and contained 9 bd. ft., it must have been 9 inches wide.

16. The perimeter = 1000 ft., the length of one side = 250 ft.,
 \therefore the area = 62,500 sq. ft.

18. Since the rectangle is 3 times as long as wide, it will make 3 squares, each containing 36 sq. ft. \therefore the dimensions of each square are 6 ft. by 6 ft., and of the rectangle 6 ft. by 18 ft.

Page 119: 235

8. Since the tank contains 10 gal., it has a volume of 2310 cu. in. [See page 129; 245.] Since it covers 77 sq. in., it must be 30 in. high.

10. Since a bushel contains 2150.42 cu. in. [See page 129; 245.] 72 bu. will contain

$$\frac{72 \times 2150.42}{1728} \text{ cu. ft.,}$$

and since the two known dimensions are 8 ft. and 4 ft., the required one is

$$\frac{72 \times 2150.42}{8 \times 4 \times 1728} \text{ or } 2.8, \text{ the no. of ft.}$$

12. $27 \times 330 \div (3 \times 4\frac{1}{2}) = 660$, the no. of ft. in the length.

Page 120: 236

1. (1) Area of lot = 120×50 sq. ft. = 6000 sq. ft.
 (2) Area of cellar = 60×30 sq. ft. = 1800 sq. ft.
 (3) Area to be covered by earth 4200 sq. ft.
 (4) $60 \times 30 \times 10$ cu. ft. = the earth removed from cellar.
 (5) $\therefore \frac{60 \times 30 \times 10}{4200}$ or $4\frac{2}{7}$ = the no. of ft. the lot is raised.
2. $\frac{3}{4}$ of $[75 \times 3.1416 \times (\frac{3}{2})^2] \times 7\frac{1}{2}$ gal. = $184.078\frac{1}{2}$ gal.
3. 600×500 sq. ft. = 300,000 sq. ft., the area bought.
 40×600 sq. ft. + $40 \times (500 - 40)$ sq. ft. = 42,400 sq. ft.,
 area of streets.
 $(300,000 - 42,400)$ sq. ft. = 257,600 sq. ft., the area sold.
 $257,600$ sq. ft. @ 20% = \$51,520.
 $\$51,520 - (\$2500 + \$425) = \$48,595$, gain.

Page 120: 236

4. (1) 1 m. = 1760 yds. (2) $\frac{3}{4}$ of 1760 yds. = 1320 yds.
 (3) 81 ft. = 27 yds.
 (4) $27 \times 1320 \times \$3.75 = \$133,650$, the cost.
5. (1) Since a cu. ft. is $7\frac{1}{2}$ gallons, the number of cubic feet
 used = $4,573,800 \div 7\frac{1}{2}$ or 609,840.
 (2) Since $\frac{1}{2}$ as much remains as was used, the contents of the
 reservoir were diminished by $\frac{1}{2}$ of 609,840 or 304,920
 cu. ft.
 (3) Since 7 acres contain 304,920 sq. ft., the depth was
 lowered 1 foot a day or 7 ft. a week.
6. (1) $(40^2 - 40) = 39 \times 40$ sq. rds.
 (2) $\frac{39 \times 40}{60} \times \$230 = \$2242.50$.

8. (1) The watch cost $\frac{4}{7}$ of the chain.
 (2) $\therefore \frac{4}{7} \times \28 or $\$192 =$ cost of watch.
9. (1) $15\% + 5\% = 20\% = \frac{1}{5}$.
 (2) $\$3.75 + \frac{1}{5}$ of $\$3.75 = \4.50 , the total cost.
 (3) $\$4.50 + \frac{1}{5}$ of $\$4.50 = \5.40 , the selling price.
10. (1) Since $\frac{2}{3}$ of the population are blacks, the whole population is $\frac{3}{2}$ of the blacks.
 (2) $\therefore 14,700 + \frac{1}{2}$ of $14,700 = 22,050$, the total population.

Page 121; 237

1. $\frac{2800}{2800} \times \frac{25}{4} \times 8 \times \frac{2}{3} \times \$5 = \$50.63$.
3. There are 4 strips and 3 seams, hence it will take
 (1) $4 \times 7\frac{1}{2}$ yds. $+ 3 \times \frac{1}{2}$ yd. $= 30\frac{1}{2}$ yds.
 (2) $30\frac{1}{2}$ yds. @ $\$0.87\frac{1}{2} = \26.98 .
4. $\frac{15}{12} \times \frac{1815}{3630} \times \frac{115}{2} \times \frac{1}{2000} = 1565.4375$ T.
5. $\frac{12 \times \frac{11}{22} \times 3.1416 \times 21 \times 21}{\frac{42}{2} \times \frac{231}{21}} = 37.6992$.
6. A sector of 120° is $\frac{1}{3}$ of a whole circle, hence is $\frac{1}{3}$ of $3.1416 \times 24^2 = 603.1872$ sq. in.
7. (1) Perimeter $= 2(375 + 280) = 1310$. (2) Area $= 8 \times 1310 = 10480$.
 (3) $10480 + 10\%$ of $10480 = 11528$. (4) Cost $= 11.528 \times \$24 = \276.67 .
8. (1) Gain per ton $= 240$ lbs. (2) \therefore gain $= \frac{24}{100} \times 12000 \times \$4 = \$5760$.

9. (1) Area except the ends $= 72 (24 + 22 + 24 + 22) = 6624$ sq. in. 1 end $= 24 \times 22$ sq. in. $= 528$ sq. in.
 (2) 6624 sq. in. $+ 528$ sq. in. $= 7152$ sq. in.
 (3) $7152 @ 6\frac{3}{4}\text{¢} = \476.80 .
12. (1) Whole area $= 100 \times 80 = 8000$.
 (2) Area with walk $= 94 \times 74 = 6956$.
 (3) Area of walk $= 8000 - 6956 = 1044$ (sq. ft.).
 (4) $\frac{1}{3}$ of $1044 = 116$, the no. of sq. yds.
 (5) 116 sq. yds. $@ 80\text{¢} = \$92.80$.

Page 122; 238

1. Since the prism and cylinder have the same heights, their volumes are to each other as their bases. Let 2 = the side of the square base, then its area is 4. 2 will then be the diameter of the base of the cylinder, and 3.1416 the area.

$$\therefore \frac{4 - 3.1416}{4} \text{ or } 0.2146 = \text{the ratio of the part cut away to the whole.}$$

2. Find how many times 80,005 less 13 will contain 88.
4. (1) There will be 5 equal sides each containing $(5\frac{5}{8})^2$ sq. ft.
 (2) $\therefore 5 \times 3\frac{5}{8} \times 3\frac{5}{8}$ or $170\frac{5}{8}$ = the no. of sq. ft.
5. (1) The flour at \$6.50 is $\frac{8}{9}$ or $\frac{1}{9}$ of its original cost.
 (2) \therefore the loaf should cost $\frac{1}{9}$ of 10¢ or 13¢.
6. The rate is 2720 to an attendance of 400×6800 or as 1 to 1000.

$$7. \frac{6 \times 8 \times 10}{12} \times 18 \times \frac{\$24.74}{100} = \$17.81.$$

8. (1) 567 books are $\frac{9}{10}$ of all.
 (2) \therefore there are $\frac{1}{9} \times 567 = 630$ in all.

10. (1) Since the area is 625 sq. rds., one side is 25 rods and the perimeter 100 rods,
 (2) \therefore the no. of feet $= 3 \times 100 \times 16\frac{1}{2} = 4950$.
11. Gain per yd. $= \frac{1}{8}$ of \$1.20 $= 24\phi$. To gain \$20.40 one must sell $\frac{20.40}{0.24}$ or 85 (yds.).
12. (1) No. of strips, 6. (2) Total carpet $= 6 \times 5\frac{1}{8}$ yds. $+ 6 \times \frac{5}{8}$ yds. $= 31\frac{1}{8}$ yds. (3) $31\frac{1}{8}$ yds. @ $85\phi = \$27.06$.

Page 124; 240

1. The house cost $\frac{2}{7}$ of the land, or $\frac{2}{7} \times \$2800 = \$10,000$.
3. $1\frac{5}{8} \times \frac{5}{8} \times 43,560 = 45,375$.
4. (1) From 2.15 to 5.36 $= 3$ hrs. 21 min., or $3\frac{3}{8}$ hrs.
 (2) $3\frac{3}{8} \times 32$ m. $= 107.2$ m.
5. (1) $\frac{3}{8}$ of 31 d. $= 20$ d. and 16 hrs. (2) \therefore the required date is 4 P.M., March 21.
6. $\frac{1}{10}$ of $(2800 \times 6 \times \$1.68) = \2822.40 .
8. 1 year's int. $= 5\frac{1}{2}\%$ of \$2300, or \$126.50. Therefore the semi-annual int. is \$63.25.
9. (1) Each face has 4×144 sq. in., or 576 sq. in. (2) The 6 faces have 3456 sq. in., which at $1\frac{1}{2}\phi = \$51.84$.
10. (1) $15\% + 5\% = 20\%$. (2) $\$12 + \frac{1}{5}$ of $\$12 = \14.40 , total cost. (3) $\$14.40 + \frac{1}{5}$ of $\$14.40 = \17.28 , selling price.
11. $\$2.75 - 90\phi = \1.85 saved on \$2.75; therefore the saving is $\frac{1}{3}\frac{3}{8}$ or $67\frac{3}{11}\%$ of the cost.
12. $33\frac{1}{3}\%$ are of school age; $\therefore 66\frac{2}{3}\%$, or twice as many, are not. $2 \times 14,769$ or 29,538, answer.

Page 126; 242

3. (1) Comparing $\frac{4}{8}$ with $\frac{3}{8}$ we have $\frac{3}{8}$ to $\frac{1}{4}$ or $\frac{2}{4}$.
 (2) $\therefore \frac{4}{8}$ is worth $\frac{3}{8}$ of what $\frac{3}{8}$ is worth. (3) $\frac{3}{8} \times \$3900 = \8320 .

5. (1) No. of strips is 24; since $18 \div \frac{3}{4} = 24$.
 (2) \therefore the cost is $24 \times 10 \times \$1.24 = \297.60 .
 If the strips are 18 yds. long, 14 strips will be needed, and will cost \$312.48.

6. (1) $\$2500 - \$1875 = \$625$. (2) \therefore the loss is $\frac{625}{2500}$ of the cost. (3) $\frac{625}{2500} = 25\%$.

7. Int. for 1 yr. = $\frac{1}{100}$ of $\$320 = \19.20
 " " 2 yrs. = $\$38.40$
 " " 6 mos. = 9.60
 " " 3 mos. = 4.80
 " " 1 mo. = 1.60
 " " 10 d. = .53
 " " 2 d. = .11
 $\$55.04$

8. (1) A loss of $\frac{1}{5}$ means selling for 80% of the cost.
 (2) Comparing 115% of the cost with 80% of it, we have $\frac{115}{80}$ or $\frac{23}{16}$.

- (3) \therefore the required price is $\frac{23}{16} \times \$240 = \345 .

9. From October 1 to March 31 inclusive is 182 days, or 13 times 14 days. 13 tons would be needed and the cost would be $13 \times \$5\frac{1}{4} = \68.25 . At $\$9\frac{1}{2}$ per ton the cost would be $13 \times \$9\frac{1}{2} = \123.50 .

10. (1) Since the yearly expenses are just 2 months' rent, the net income is for 10 months or \$480.
 (2) This is $\frac{48}{560}$ or $\frac{1}{20}$ of the cost. (3) $\frac{1}{20} = 5\%$.

11. Since the selling price is $\frac{7}{8}$ of the cost, the cost is $\frac{8}{7}$ or $1\frac{1}{7} \times$ the selling price or $\$1582 + \frac{1}{7}$ of $\$1582 = \1808 , or $\$7.53$ per bbl.

12. A cubic foot will make 8 6-inch cubes, hence a 6-inch cube will weigh $\frac{1}{8}$ of 165 lbs. or $20\frac{1}{8}$ lbs.

Page 128; 244

1. Comparing $15\frac{1}{2}$ with $2\frac{3}{4}$, i. e., $\frac{127}{22}$ with $\frac{9}{4}$ we have $\frac{127}{22}$;

hence the required cost is $\frac{127}{22} \times \frac{1.05}{\cancel{22}^{23.10}} = \133.35 .

3. $\frac{3}{2} \times \frac{3^5}{2} \times \frac{3^5}{2} \div 9 = 22\frac{3}{4}$, no. of sq. yds.

5. (1) At 3 P.M. 15 hrs. of the day have passed or $\frac{1}{2}\frac{1}{4}$ or $\frac{5}{8}$ of the whole.

(2) $\frac{5}{8} = 62\frac{1}{2}\%$.

6. $\frac{3}{4}\%$ of $\$2400 = \frac{3}{4}$ of $\$24 = \18 .

7. Int. for 1 yr. = $\frac{6}{100}$ of $\$400 = \24

" " 3 yrs. = $\$72$

" " 3 mos. = 6

" " 15 d. = 1

" " 5 d. = 0.33

$\$79.33$

8. (1) $4\frac{5}{12} - 3\frac{5}{18} = 1\frac{5}{12}$. (2) Comparing $1\frac{5}{12}$ with $3\frac{5}{18}$ or $\frac{5}{12}$ with $\frac{15}{12}$ we have $\frac{1}{3}$. (3) $\frac{1}{3} = 33\frac{1}{3}\%$.

9. (1) Comparing 12^2 with 16^2 we have $\frac{9}{16}$. (2) $\frac{9}{16} = 56\frac{1}{4}\%$.

10. (1) $37\frac{1}{2}\% = \frac{3}{8}$. (2) Comparing $\frac{3}{8}$ with $\frac{3}{8}$ or $\frac{3}{8}$ with $\frac{1}{4}$ we have $\frac{3}{8}$. (3) $\frac{3}{8}$ of $\$3900 = \8320 .

12. (1) Comparing 115% with $106\frac{1}{4}\%$ we have $\frac{4}{5}\frac{1}{2}$.
 (2) $\frac{4}{5}\frac{1}{2} \times \$4.25 = \$4.60$.
13. (1) Comparing $\frac{7}{8}$ with $\frac{1}{3}$ of $\frac{3}{4}$ or $\frac{1}{4}$ we have $\frac{1}{3}\frac{1}{2}$ to $\frac{3}{4}\frac{1}{2}$ or $\frac{1}{2}\frac{1}{4}$.
 (2) $\frac{1}{2}\frac{1}{4} \times 8600 = \4095.24 .
14. (1) $0.096 = \frac{96}{1000}$. (2) Since 375 is $\frac{3}{8}$ of 1000, we take $\frac{3}{8}$ of both numerator and denominator. (3) $\frac{\frac{3}{8} \text{ of } 96}{\frac{3}{8} \text{ of } 1000} = \frac{36}{375}$.
15. $\frac{1}{8} = \frac{2}{16}$; $\frac{1}{7} = \frac{2}{14}$; therefore $\frac{1}{8}$ is $4\frac{1}{2}$ times as large as $\frac{1}{16}$.

THE SOUTHWORTH-STONE ARITHMETICS

MANUAL FOR TEACHERS

SUGGESTIONS AND SOLUTIONS — EIGHTH YEAR

Book III, Part II (Three-Volume Edition)

OR

Book II, Chapter III (Two-Volume Edition)

Note. The first one of a double-page reference refers to the three-volume edition, the other, to the two-volume edition.

Page 131 ; 247

Percentage. In this final review of percentage the pupil should be led to see very clearly that *per cent* is only a convenient term for *hundredths*, and hence that the subject of “percentage” contains no new class of problems.

To find *a given per cent of a number* have the pupil either compare what is wanted with what is given and find their relation, or find 1%, then the required per cent, the method depending upon the problem. For example:—

(a) “Find $16\frac{2}{3}\%$ of 360.” Since $16\frac{2}{3}\%$ of anything is equal to $\frac{1}{3}$ of it, we are to find $\frac{1}{3}$ of 360.

(b) “Find 7% of 2800.” Since 1% of 2800 is 28, 7% of 2800 is 7×28 or 196.

To find *what per cent one number is of another*, the pupil should see that their relation expressed as hundredths is all that is wanted. Thus, “Find what per cent 18 is of 56.” The relation of 18 to 56 is $\frac{18}{56}$ or $\frac{9}{28}$.

$$\frac{9}{28} = 0.321 \text{ or } 32\frac{1}{4}\%.$$

To find *all when a certain per cent is known*. This is a simple problem in comparison. For example: “15% of a certain sum is

\$3600. Find all of it." Now *all* or 100% is wanted and 15% is known. Therefore we want $\frac{100}{15}$ of what is known or $\frac{100}{15} \times \$3600$.

Pages 132-135; 248-251 are very important and should not be omitted. These simple questions and problems are designed to lead the pupil to a clear understanding of the subject, and prepare him for the more difficult "written work."

Page 136; 252

2. Since 75% can be expressed as a fraction in smaller terms, method *a* is preferable, being shorter.

5. Since $43\frac{1}{2}\%$ cannot be expressed as a simple fraction in small terms, use method *b*.

6. For same reason use method *b*.

7. Since $12\frac{1}{2}\% = \frac{1}{8}$, use method *a*.

8. Another method would be: find 34% and 28% of 12,650, and subtract their sum from 12,650. Since both are required in the answer, this method is as short as the one in the text.

Page 137; 253

1. Observe the "explanation" and lead the pupils to see that finding a per cent is simply changing a common fraction to a decimal, *hundredths*.

WORK

$$\begin{array}{r} 2. \quad 0.71 = 71\% \\ 8500)6035.00 \\ \underline{59500} \\ 8500 \\ \underline{8500} \end{array}$$

ANALYSIS

Since the number that bought tickets was $\frac{71}{100}$ of the number in attendance, we have simply to express $\frac{71}{100}$ in *hundredths* or per cent.

Note. See that pupils can make a proper analysis and then perform the work in the shortest possible manner.

5. (1) $100\% - (37\frac{1}{2}\% + 16\frac{2}{3}\%) = 45\frac{5}{6}\%$; (2) $16\frac{2}{3}\% = \frac{1}{3}$; $37\frac{1}{2}\% = \frac{3}{8}$.

(3) $\$38,475 - (\frac{1}{3} \text{ of } \$38,475 + \frac{3}{8} \text{ of } \$38,475) = \$17,634.37$.

6. (1) Since I lost \$8 on what cost me \$25 the loss was $\frac{8}{25}$ of the cost. (2) $\frac{8}{25} = \frac{32}{100}$ or 32%.

7. (1) A loss of 15% would make the selling price 85% of the cost.

(2) 85% of \$25 = \$21.25.

8. $\frac{1}{4}\frac{3}{4} = \frac{3}{8} = 44\frac{1}{2}\%$.

10. (1) $175,000 - 145,000 = 30,000$.

(2) 30,000 is $\frac{30}{175}$ or $\frac{6}{35}$ of 175,000.

(3) $\frac{6}{35} = 0.17\frac{1}{7} = 17\frac{1}{7}\%$.

11. 124% of 37,860 = 46,947.

Page 138; 254

1. Observe that in the analysis of example 1, we simply compare what is wanted with what is given and thus discover the work to be done.

8. (1) $100\% - 58\% = 42\%$, the per cent of decrease. Observe that we have given 58% and want 42% or $\frac{21}{25}$ of what is given.

(2) $\frac{21}{25} \times 145,000 = 105,000$, the decrease.

(3) $145,000 + 105,000 = 250,000$ the total in 1890.

A second solution would be, —

$\frac{100}{145} \times 145,000 = 250,000$, the population of 1890.

$250,000 - 145,000 = 105,000$, the decrease.

9. $\frac{100 \times \overset{79}{\cancel{2844}}}{\underset{9}{36}} = 7900$.

Page 138; 254

10. (1) 20% of $20\% = 4\%$. (2) 4% of the mill sold for \$38,000. (3) \therefore the mill is worth

$$\frac{100}{4} \times \frac{9500}{\cancel{38000}} = \$950,000.$$

11. (1) Since 25% is land, 75% is water, or there are 3 times as much water as land. (2) $3 \times 50,000,000$ sq. m. = $150,000,000$ sq. m., the water.

12. (1) Since $391 + 19$ or 410 pupils are all but $37\frac{1}{2}\%$ of the enrollment, (2) 410 is $\frac{2}{5}$ of the enrollment. (3) The enrollment then is $\frac{5}{2}$ of 410 or 656.

13. (1) Since 5% is \$12,597 of his property, (2) all of it is 20 times as much or \$251,940.

14. (1) The number sold to Eastern markets is $\frac{10}{8}$ or $\frac{5}{4}$ of the number to Chicago markets. (2) $\frac{5}{4}$ of 381 = 635. (3) $635 + 381 = 1016$, the number sold. (4) $2 \times 1016 = 2032$, the number at first.

15. (1) $\frac{100}{40} = \frac{5}{2}$. (2) $\frac{5}{2}$ of \$470 = \$1175.

Page 139; 255

1. Rate of gain in each = $\frac{3}{12}$ or $\frac{1}{4}$; $\frac{6}{20}$, $\frac{1}{4}$; $\frac{25}{100}$ or $\frac{1}{4}$; $\frac{36}{144}$ or $\frac{1}{4}$, hence all are the same.

2. $\frac{2}{3}$ is 100 times $\frac{2}{3}\%$ of anything.

4. (1) Number of games played = 12.

(2) 7 won out of 12 is $\frac{7}{12}$ or $58\frac{1}{3}\%$.

7. A loss of 6 strokes from 36 is a loss of $\frac{1}{6}$ or $16\frac{2}{3}\%$.

14. (1) $\frac{2}{3}\%$ of \$1250 = $\frac{2}{3}$ of \$12.50 = \$8.33. (2) \$1250 - \$8.33 = \$1241.67.

15. (1) $2\frac{1}{4}\%$ is known, 100% is wanted, or we want $\frac{100}{2\frac{1}{4}}$ of the known.
 (2) $12 \times \frac{100}{2\frac{1}{4}} \times \$22.50 = \$12,000.$
16. (1) $320 - (108 + 96) = 116.$ (2) $\frac{11}{8} = 0.36\frac{1}{4} = 36\frac{1}{4}\%.$
17. (1) The loss was 27% and 73% was saved. (2) The loss then was $\frac{27}{73}$ of the sum realized or $\frac{27}{73}$ of \$1660 or \$613.97.

Page 140 ; 256

The drill pages serve more for review purposes when pupils are in need of work, than for a regular part of the course. They may be taken in whole or part or omitted at the discretion of the teacher.

Page 141 ; 257

1. 130% of \$5000 = \$6500.
3. Since the gain is 20% , the cost is 5 times the gain or \$60, and the selling price is 6 times the gain or \$72.
8. (1) 50¢ gain on \$3.00 is a gain of $\frac{1}{6}$ or $16\frac{2}{3}\%.$
 (2) A gain of 80¢ on \$4.00 is $\frac{1}{5}$ or $20\%.$
9. (1) A reduction of 40¢ on \$2.00 is a reduction of $\frac{1}{5}$ or $20\%.$
 (2) $\frac{1}{5}$ of \$45 = \$9, saved.
10. An increase of \$2 over \$6 is $\frac{1}{3}$ or $33\frac{1}{3}\%.$
11. (1) Since $14\frac{2}{7}\% = \frac{1}{7}$ and $12\frac{1}{2}\% = \frac{1}{8}$, the \$5600 is $\frac{7}{8}$ the cost of one and $\frac{7}{8}$ the cost of the other.
 (2) The gain on the one is $\frac{1}{8}$ of 5600 or \$700; and the loss on the other is $\frac{1}{7}$ of \$5600 or \$800. Hence the net loss is \$100.
12. (1) Marked price = \$1.75 + $\frac{1}{5}$ of \$1.75 = \$2.10.
 (2) Selling price = $\frac{2}{3}$ of \$2.10 = \$1.40, or a loss of 35¢.
 (3) 35¢ is $\frac{1}{5}$ of \$1.75 or $\frac{1}{5}$ of \$1.75; $\frac{1}{5} = 20\%$ loss.
13. $\frac{1}{9}$ of 160 = 145.45+.

Page 142 ; 258

3. $\$4800 + 16\%$ of $\$4800 = \5568 .
4. (1) We are given 125% of the cost to find 100% of it.
(2) Therefore we want $\frac{1}{2}$ or $\frac{1}{2}$ of $\$7500$ or $\$6000$.
5. $\frac{1}{10}$ died; $\frac{9}{10}$ or 639 were left; therefore $\frac{1}{9}$ of 639 or 71 died.
7. (1) 6% of his property = $\$3000$. (2) 1% of it = $\$500$.
(3) $100\% = \$50,000$. (4) $\$50,000 - \$3000 = \$47,000$, what he was worth.
8. (1) 40% of the cost = $\$800$. (2) Hence the cost is $\frac{1}{4}$ of $\$800 = \2000 .
10. (1) Since I get 90% of the marked price, the goods were marked at $\frac{10}{9}$ of what I get.
(2) $\frac{10}{9}$ of $(\$1.20 + \frac{1}{3} \text{ of } \$1.20) = \frac{10}{9}$ of $\$1.44 = \1.60 .
11. (1) 80% of the marked price = $\$2.00 + 40\%$ of $\$2.00 = \2.80 .
(2) Therefore all the marked price = $\frac{10}{8}$ of $\$2.80 = \3.50 .

Page 145 ; 261

1. (1) 3% on 16% invested is $\frac{3}{16}$ or $18\frac{3}{4}\%$ gained.
(2) 8% on 56% invested is $\frac{1}{4}$ or $14\frac{1}{2}\%$ gained.
2. (1) 2% gained on 28% invested is $\frac{1}{14}$ or $7\frac{1}{2}\%$.
(2) $7\frac{1}{2}\%$ of $\$140 = \10 .
3. (1) 3 qts. of each gal. do not spoil, and sell for 24% .
(2) 4% gained on 20% invested is $\frac{1}{5}$ or 20% .
4. (1) Since $5\% = \$200$, (2) 100% or the whole = $20 \times \$200$ or $\$4000$, and $12 \times \$4000 = \$48,000$.
(3) $\$4000 + \$200 = \$4200$, and $12 \times \$4200 = \$50,400$.
5. (1) 15% of the sales is $\$1200$.
(2) Hence the sales are $\frac{10}{3}\%$ of $\$1200 = \8000 .

(3) $\$8000 - \$1200 = \$6800 = \text{remittance} = \frac{2}{3} \text{ cost.}$

(4) Hence the cost $= \frac{3}{2}$ of $\$6800 = \$5950.$

(5) Since 50 cost $\$5950$ one cost $\frac{1}{50}$ of $\$5950$ or $\$119.$

6. (1) 64 gals. of mixture cost $50 \times \$2.50$ or $\$125.$

(2) 64 gals. sell for $64 \times (\frac{1}{16} \text{ of } \$2.50)$ or $\$144.$

(3) The gain is $\frac{\$144 - \$125}{\$125} = \frac{19}{125}$ or $15\frac{1}{5}\%.$

7. (1) $\$60 - 10\% \text{ of } \$60 = \$54.$ (2) $\$54$ is $\frac{3}{8}$ of the cost.

(3) Hence the cost is $\frac{8}{3}$ of $\$54$ or $\$48.$ (4) $\$2$ gained on $\$48$ invested is $\frac{1}{24}$ or $4\frac{1}{6}\%.$

8. (1) $\frac{3}{4}$ of $\$1200 + \$200 = \$1100$, the selling price.

(2) Loss $= \$1200 - \$1100 = \$100.$

(3) $\$100$ loss on $\$1200$ invested is $\frac{1}{12}$ or $8\frac{1}{3}\%.$

9. (1) Selling $\frac{1}{3}$ of a ton for the cost of $\frac{1}{2}$ ton is a gain of $\frac{1}{6}$ of a ton on every $\frac{1}{3}$ of a ton. (2) $\frac{1}{6}$ is $\frac{1}{2}$ of $\frac{1}{3}.$ (3) Hence the gain is $\frac{1}{2}$ or $50\%.$

10. (1) Total cost $= \$200 + \$40 = \$240.$ (2) Net gain $= \$275 - \$240 = \$35.$ (3) $\$35$ gained on $\$240$ invested is $\frac{35}{240}$ or $14\frac{7}{12}\%.$

11. (1) $\$3042$ is 117% of the cost.

(2) $\$2392$ is $\frac{2392}{3042} \times 117\%$ of the cost or 92% of the cost.

(3) Hence there is a loss of $8\%.$

12. (1) Since 117% of the cost is 3042 , (2) 200% of the cost would be $\frac{200}{117} \times \$3042 = \$5200.$

13. (1) I paid $\frac{5}{6}$ of $\$6$ or $\$5.$ (2) Since $\$5$ is $\frac{5}{6}$ of the cost, (3) the cost is $\frac{6}{5}$ of $\$5$ or $\$4.$

Pages 146, 147; 262, 263

Lead the pupil to develop the two "6% methods" on these and the following pages. Note the model solutions.

Page 151; 267

Local custom should be followed in finding the time between dates. The first process is probably the more common.

Page 156; 272

Pupils should become expert in the calculation of interest. Abundant exercises are given, and such use of the drill table should be made as conditions warrant. Do not waste time in needless drills.

Page 159; 275

2. (1) \$150 less $\frac{1}{5}$ (or 20%) of \$150 = \$120. (2) \$120 less $\frac{1}{10}$ (or 5%) of \$120 = \$114.

Second method: $\frac{1}{5} \times \frac{1}{5} \times \$150 = \$114$.

3. (1) \$100 - $\frac{1}{10}$ of \$100 = \$90, the cost when a 10% discount is given.

(2) \$100 - 5% of \$100 = \$95. (3) \$95 - 5% of \$95 = \$90.25, hence the first is 25¢ better.

4. (1) 480 less 15% of \$480 = \$408. (2) \$408 less 5% of \$408 = \$387.60.

(3) \$480 less $\frac{1}{10}$ of \$480 = \$432. (4) \$432 less $\frac{1}{10}$ of \$432 = \$388.80.

(5) \$388.80 - \$387.60 = \$1.20 or $\frac{1}{4}$ % of \$480.

Page 160; 276

1. (1) 70% of \$2000 = \$1400, the cost to the first.

(2) $\frac{1}{2} \times \frac{3}{4} \times \$2000 = \$1425$, the cost to the second.

2. (1) $\$12,438 - \$118 = \$12,320$, the invoice price.
 (2) 85% of $\$12,320 = \$10,472$. (3) $\$10,472 + \$118 = \$10,590$.

4. (1) A discount of 70% leaves the cost 30% of the list price.
 (2) 10% of 30% of the list $= 3\%$ of the list. (3) \therefore the total discount is 73% of the list.

5. (1) $\$500 - \$425 = \$75$ discount. (2) $\$75$ is $\frac{7}{100}\%$ or $\frac{1}{100}\%$ of $\$500$ or 15% .

8. (1) $\$11,000$ less 5% discount $= \$10,450$. (2) $\frac{1}{2}\%$ of $\$10,450 = \52.25 . (3) $\$10,450 - \$52.25 = \$10,397.75$.

The form for blackboard work for such problems may be somewhat as follows:—

9.	\$1000	10.	20)\$648
	<u>.7</u>		<u>32.40</u>
	10)\$700		20)615.60
	<u>70</u>		<u>30.78</u>
	20)\$630		20)584.82
	<u>31.50</u>		<u>29.24</u>
	\$598.50		\$555.58

11.	\$1500
	<u>.6</u>
	\$900
	<u>.85</u>
	\$765.00
	<u>53.55 = (7% of \$765)</u>
	20)\$711.45
	<u>35.57</u>
	\$675.88

12.	13 books @ \$1.50	= \$19.50
	10 " @ 1.75	= 17.50
	15 " @ 1.10	= 16.50
	1 " @ 18.00	= 18.00
	12 " @ 90¢	= 10.80
		6) \$82.30
		13.72
		\$68.58
		1.37 = (2% of \$68.58)
		\$67.21

Page 162; 278

12. (1) Since $1\frac{1}{2}\%$ of the insured value = \$27, the total insurance is $\frac{27}{.015} \times \$27$ or \$1800. (2) Since $\frac{3}{4}$ of the real value is \$1800, the whole value is $\frac{4}{3} \times \$1800$ or \$2400.

Note. Such problems may be solved as follows, writing all the work to be done:—

$$13. \frac{\frac{3}{2}}{\frac{2}{3}} \times \frac{400}{\frac{800}{3}} \times \$3750 = \$1,500,000.$$

(Have the statement analyzed.)

14. (1) 12 premiums at \$120 = \$1440. (2) \$1440 is $\frac{1}{8}\frac{4}{5}$ of \$8000. (3) $\frac{1}{8}\frac{4}{5} = \frac{1}{10}\frac{4}{5} = 18\%$.

15. Since $7\frac{1}{10}\%$ of the insured value is \$280 and the insured value is 80% or $\frac{4}{5}$ of the real value the statement is

$$\frac{4}{5} \times \frac{1000}{7} \times \$280 = \$50,000.$$

$$16. \text{Statement: } \frac{1}{4} \times \frac{500}{2} \times \$800 = \$50,000.$$

Page 164; 280

2. (1) 1000 doz. @ 13¢ = \$130. (2) 1000 doz. @ 19¢ = \$190.

(3) 2% of \$190 = \$3.80, the commission. (4) \$130 + \$3.80 + \$3.40 = \$137.20.

(5) \$190 - \$137.50 = \$52.50 gain.

3. 6 harvesters @ \$115 =	\$690
4 mowers @ \$85 =	340
	5) \$1030
	\$206 = 20% commission.
	37.50 = expenses.
	\$168.50

4. (1) Commission and storage $2\frac{1}{2}\% + 1\frac{1}{2}\% = 4\%$.

(2) 4% of \$11,450 = \$458. (3) \$458 + \$21 = \$479.

(4) \$11,450 - \$479 = \$10,971.

14. (1) 350 bu. @ \$1.15 = \$402.50. (2) 3% of \$402.50 = \$12.08, B's commission. (3) \$350 + \$12.08 = \$362.08.
(4) \$402.50 - \$362.08 = \$40.42, A's gain.

15. (1) \$6000 - (\$240 + \$18 + \$742) = \$5000, the cost.

(2) \$240 is $\frac{24}{600}$ of \$6000. (3) $\frac{24}{600} = \frac{2}{100} = 2\%$.

Page 166; 282

1. Since \$669.50 is the cost plus a 3% com. it is 103% of the cost, and the commission is $\frac{3}{103} \times \$669.50 = \19.50 .

2. (1) \$1332.50 is $102\frac{1}{2}\%$ of the cost. (2) Hence the cost is $\frac{205}{208} \times \$1332.50 = \1300 . (3) \$1300 ÷ \$6.50 = 200, the number of bbls.

3. $1\frac{1}{4}\%$ of \$2400 = \$30.

4. Since 5% of the selling price of the wool = \$208.50, the whole selling price = $20 \times \$208.50 = \4170 .

5. (1) $1\frac{3}{8}\% \times \$603.75 = \575 , the price of flour.

(2) $\$575 \div \$5 = 115$, the number of bbls.

6. Since $101\frac{1}{2}\%$ is known and $1\frac{1}{2}\%$ is wanted, the solution is:

$$(1) \frac{1\frac{1}{2}}{101\frac{1}{2}} = \frac{3}{203}.$$

$$(2) \frac{3}{203} \times \$2639 = \$39.$$

8. (1) $\$2929.50$ is $94\frac{1}{2}\%$ of the sales. (2) The commission is $5\frac{1}{2}\%$. Solution:

$$\frac{5\frac{1}{2}}{94\frac{1}{2}} = \frac{11}{189};$$

$$\frac{11}{189} \times \$2929.50 = \$170.50.$$

9. (1) Selling price = $\$5000$. (2) Remittance = $\$4750$.

(3) Com. = $\$250$. (4) $\$250$ is $\frac{1}{20}$ of $\$5000$. (5) $\frac{1}{20} = 5\%$.

Page 167; 283

1. $\$480.$

$$\begin{array}{r} 48. \\ 432. \\ \hline 43.20 \\ 388.80 \\ \hline 38.88 \\ 349.92 \\ 34.99 \\ \hline \$314.93 \end{array}$$

2. $\frac{3}{4} \times 200 \times \$40 = \$12,000.$

3. (1) $40,000 @ 9\frac{3}{8}\% = \$3950.$

(2) $\frac{3}{4}\%$ of $\$3950 = \$29.63.$

(3) $\$3952 + \$29.63 + \$143.75 = \$4123.38.$

5. Money being worth 6% or $\frac{1}{2}\%$ for 30 days, the 5% off for cash is the better offer by $1\frac{1}{2}\%$; $1\frac{1}{2}\%$ of $1000 \times \$1.12\frac{1}{2} = \$16.87.$

7. The $\$3860$ is $96\frac{1}{2}\%$ of the whole sales. Therefore the whole sales were $\frac{100}{96\frac{1}{2}} \times \$3860 = \$4000.$

Page 168; 284

1. (1) 2% of $\$437 = \$8.74 =$ commission.

(2) $\$437 - \$8.74 = \$428.26 =$ net proceeds.

2. (1) $\$27.50 = 1\%$ of gro. proceeds.
 (2) $100 \times \$27.50$ or $\$2750 =$ gro. proceeds.
 (3) $\$2750 - (\$27.50 + \$47.50) = \2675 , net proceeds.
3. (1) $\$250 - \$200 = \$50$, expenses and commission.
 (2) $\$50 - \$25 = \$25$, expenses.
 (3) $\$25 = \frac{1}{10}$ of $\$250$; $\frac{1}{10}$ or 10% = rate of commission.
4. (1) $100\% - 2\% = 98\%$, or net proceeds.
 (2) $\$900 = 98\%$ of gro. proceeds.
 (3) $\$900 \div 98\% = \918.37 gro. proceeds.
 (4) 2% of $\$918.37 = \$18.37 =$ commission.
5. (1) $\$100 + \$18 = \$118 =$ expenses and commission.
 (2) $\$1200 - \$118 = \$1082$, net proceeds.
 (3) $\$18 = \frac{3}{200}$, or $1\frac{1}{2}\%$ of $\$1200$. Rate of com. = $1\frac{1}{2}\%$.
6. (1) $\$1680 - \$60 = \$1620$, expenses and commission.
 (2) 4% of $\$1680 = \67.20 , commission.
 (3) $\$1620 - \$67.20 = \$1552.80$, expenses.
7. (1) $\$437.18 + \$13.52 = \$450.70$, gro. proceeds.
 (2) $\$13.52 \div \$450.70 = 3\%$, rate of commission.
8. (1) $1\frac{1}{2}\%$ of $\$430 = \6.45 , commission.
 (2) $\$430 - (\$6.45 + \$2.50) = \$421.05 =$ balance.
9. (1) $\$577.50 - \$24.50 = \$553$; $\$553 = 105\%$ of investment.
 (2) $\$553 \div 105\% = \526.67 , value of goods bought.
10. (1) $\$200 + \$4.37 = \$204.37$; $\$204.37 = 95\frac{1}{2}\%$ of gro. receipts.
 (2) $\$204.37 \div 95\frac{1}{2}\% = \$214 =$ gro. receipts.
 (3) $\$200.00 =$ remittance;
 $\$214 - \$204.37 = 9.63 =$ commission;
 $\quad \quad \quad 4.37 =$ expenses;
 $\quad \quad \quad \underline{\$214.00} =$ gro. receipts.

Page 168; 284

11. (1) $\$20,500 - \$100 = \$20,400$.
 (2) $\$20,400 \div 102\% = \$20,000$ spent for wool.
12. (1) $\$595.80 - \$6.60 = \$589.20 = \text{amt. of purchase, etc.}$
 (2) $\$6.60 \div \$589.20 = 0.0112 = \text{rate of commission.}$
13. (1) $\$179.76 - (\$148.30 + \$27.94) = \$3.52, \text{ commission.}$
 (2) $\$3.52 \div \$148.30 = 0.0237 = \text{rate of commission.}$
14. (1) $\$755 + \$22.65 = \$777.65 = \text{remittance.}$
 (2) $\$22.65 \div \$755 = 0.03 = \text{rate of commission.}$
15. (1) $\$9.90 = 5\% \text{ of purchase.}$
 (2) $20 \times \$9.90 = \$198 = \text{purchase.}$
 (3) $\$198 + \$9.90 = \$207.90 = \text{remittance.}$
16. (1) $\$1293.75 = 103\frac{1}{2}\% \text{ of purchase.}$
 (2) $\$1293.75 \div 103\frac{1}{2}\% = \$1250 = \text{amount of purchase.}$
 (3) $\$1293.75 - \$1250 = \$43.75 \text{ com., or } 3\frac{1}{2}\% \text{ of } \$1250.$
17. (1) $2\frac{1}{4}\% \text{ of } \$684.10 = \$15.39, \text{ commission.}$
 (2) $\$684.10 + \$88 + \$15.39 = \$787.49, \text{ remittance.}$

Pages 169-172; 285-288

In all exercises with promissory notes there should be actual business transactions in which notes are used in conformity with local conditions.

Page 171; 287

1. (1) From Mar. 17, '04, to Sept. 14, '05 = 1 yr. 5 mos. 28 d.
 (2) Int. of \$1 at 6% for 1 yr. 5 mos. 28 d. = $\$0.089\frac{2}{3}$.
 (3) $240 \times \$0.089\frac{2}{3} = \21.52 .
 (4) $\$240 + \$21.52 = \$261.52 \text{ (no grace).}$

Pages 173-177; 289-293

Since the problems of partial payments are solved by rule and a model solution given in the text, solutions are not given here. As much attention may be paid the subject as conditions warrant. Be sure that problems are *understood* before their solution is attempted.

Page 178; 294

Tax laws differ somewhat in different States but general principles are the same. Pupils should vitalize the subject by applying it to local conditions with original problems.

Page 179; 295

2. (1) \$4,000,000. = \$4000 thousand.
 (2) $4000 \times \$12\frac{1}{2} = \$50,000$.
 (3) $\$125 \div \$12\frac{1}{2} = 10$ (thousand) or \$10,000.
5. (1) $\$1770 \div \$120,000 = 0.01475$ or $1\frac{1}{2}\%$ or \$14.75 per \$1000.
 (2) $1\frac{1}{2}\%$ of \$100 = \$1.48.
17. (1) $\$1044 + \$4500 + \$36,300 = \$41,844$, total tax.
 (2) $\$41,844 - (1800 \times \$2.75) = \$36,894$, property tax.
 (3) $\$36,894 \div \$3,000,000 = \$1.2298\%$ or \$12.30 per \$1000.

Page 181; 297

13. (1) 20 bbls. @ 42 gal. each = 840 gal. (2) $840 - 30 = 810$, the number of gallons upon which duty was paid.
 (3) 810 gal. @ $7\frac{1}{2}\%$ = \$60.75. (4) $\frac{30}{840} = \frac{1}{28}$ or $3\frac{1}{2}\%$ leakage.
14. (1) $122\frac{1}{2}\%$ of the invoice = \$183.75. (2) Invoice = $\frac{300}{245} \times \$183.75 = \150 .

15. (1) $6s. = \$1.46$. (2) $200 \text{ yds. @ } \$1.46 = \292 .
 (2) 40% of $\$292 = \116.80 , the *ad valorem* duty.
 (4) $\frac{3}{4} \times 200 \times 28¢ = \42 , the specific duty.
 (5) $\$292 + \$116.80 + \$42 = \450.80 .
16. (1) $\$740 - \$20 - \$120 = \600 . (2) $\$120$ is $\frac{1}{5}$ of $\$600$.
 (3) $\frac{1}{5} = 20\%$.
17. (1) Total cost $2 \times 60f. = 120f.$ per doz. or $10f.$ each. (2)
 $10f. = \$1.93$. (3) $\$2.25 - \$1.93 = \$0.32$.
18. $40\% = \frac{2}{5}$; $\frac{2}{5} \times 50 \times \frac{1}{4} \times \$4.8665 = \$121.66$.
19. $\frac{1}{2} \times 12 \times 36 \times \$4.8665 = \$1051.16$.
20. $\frac{2}{3} = \frac{2}{3} = 66\frac{2}{3}\%$, *ad valorem* duty.

Pages 184-188; 300-304

The trouble that pupils often have with the subject of bank discount lies not in its inherent difficulty, but in the fact that it has not yet come into their experience. The remedy lies in making all operations as realistic as possible. The writer has found it helpful to open a bank of discount in the schoolroom for the actual discounting of notes by and for pupils. The "term of discount" should be made clear as being the time the borrower uses the bank's money. A few typical examples on page 189; 305 are solved to show methods and arrangement of work.

Page 189; 305

1. (1) The int. of $\$1200$ for 4 mos. at $9\% = \$36$.
 (2) Amt. due at maturity $= \$1236$, the amount which the banker buying the note will receive.
 (3) Int. of $\$1236$ for 3 mos. at $4\% = \$12.36$ (bank discount).
 (4) $\$1236 - \$12.36 = \$1223.64$, the proceeds.

2.
$$\begin{array}{r} \$500 \\ .05 \\ \hline 6)\$25.00 \\ \$4.17 \\ 500. \\ \hline \$504.17, \text{ amt. at maturity.} \end{array}$$
- Int. for 60 d. at 6% $\frac{5.0417}{1.0083}$
 " " 12 " " $\frac{1.0083}{\$4.03, \text{ bank discount.}}$
 " " 48 " " $\frac{\$4.03}{\$500.14, \text{ proceeds.}}$

3.
$$\begin{array}{rcl} \text{Due,} & \text{Aug. 14, 1904.} & \\ \text{Dis.,} & \text{June 12, 1904.} & \\ \text{Term of dis.,} & 62 \text{ days.} & \\ \text{Face of note} & = & \$720. \\ \text{Int. for } \frac{1}{4} \text{ yr. at } 8\% & = & 14.40 \\ \text{Value at maturity} & = & \$734.40 \\ \text{Int. for 60 d. at } 6\% & = & 7.344 \\ \text{Int. for 2 d. at } 6\% & = & .245 \\ \text{Bank discount} & = & \$7.59 \\ \text{Proceeds} & = & \$726.81 \end{array}$$

5. A year's int. of \$400 at 8% is \$32; $\frac{1}{4}$ year's int. is $\frac{1}{4}$ of \$32 or \$3.56. $\$400 - \$3.56 = \$396.44$, proceeds.

6.
$$\begin{array}{rcl} \text{Apr. 10 to Aug. 10} & = & 122 \text{ days.} \\ 122 \text{ d.} - 25 \text{ d.} & = & 97 \text{ d., the term of discount.} \\ \text{Face} & = & \$1000. \\ \text{Int. for 60 d. at } 6\% & = & \$10.00 \\ \text{" 30 " " } & = & 5.00 \\ \text{" 6 " " } & = & 1.00 \\ \text{" 1 " " } & = & .17 \\ \hline \text{" 97 " " } & = & \$16.17 \\ \text{" 97 " } 1\% & = & 2.69 \\ \hline \text{" 97 d. at } 7\% & = & \$18.86, \text{ dis.} \\ \text{Proceeds} & = & \$981.14 \end{array}$$

- II. (1) $\$600 - \$591 = \$9$, the int. of $\$600$ for 60 days.
 (2) $\$9$ for 60 d. is $\$54$ per year. (3) $\$54$ is 9% of $\$600$.

Note. The above are sufficient to give the form. Observe that the banker receives interest on what is to be paid him at maturity, and for the time that he is without the use of the money paid for the note.

Page 190 ; 306

If possible study some local stock company, and make clear the meaning of all the terms involved, — common stock, preferred stock, dividends, face value and par value, premium, discount, etc. The problems are no more difficult than any other simple problems of percentage, but the grammar school pupil is unacquainted with the terms used. The oral problems on page 193 ; 309 may bring the subject more within his own experience.

While the par value or face value of stock is fixed by each individual company and varies, the stock quotations refer to stock whose face value is $\$100$. Stock quoted at 87 sells for $\$87$ for a $\$100$ share.

Page 194 ; 310

1. $35 \times \$143\frac{1}{2} = \5022.50 .
2. $35 \times \$56\frac{1}{2} = \1977.50 .
3. $\$1728 \div \$14\frac{2}{3} = 120$, the no. of shares, or $\$12,000$ worth.
4.
$$\frac{170 \times \$103 - \$8510}{\$50} = 180$$
, the number of shares.
5. $1200 \times (\$115 - \$58) = \$68,400$.
6. (1) $\$16,400,000 - (\$14,800,000 + \$600,000) = \$1,000,000$
 to be paid in dividends. $\$1,000,000$ is $\frac{1}{8}$ of the investment of $\$8,000,000$ and hence the dividend is $12\frac{1}{2}\%$.
7. $\$3750 \div \$118 = 31$ and a remainder of $\$92$.

8. (1) Net gain on each share $\$6\frac{1}{4}$. (2) $\$2133 \div \$6\frac{1}{4} = 316$, the number of shares.

9. (1) Since the broker got $\frac{1}{8}$ for selling he paid me $\$214\frac{7}{8}$ for each share sold. (2) $\$8595 \div \$214\frac{7}{8} = 40$, the number of shares.

10. (1) Total cost $122\frac{7}{8} + \frac{1}{8} = 123$. (2) Net selling price $126\frac{3}{8} - \frac{1}{8} = 126\frac{2}{8}$. (3) Gain, $\$3\frac{5}{8}$ per share. (4) $50,000 \times \$3\frac{5}{8} = \$181,250$.

Page 195 ; 311

Bonds must not be confused with stocks although the two are usually treated together and both may be quoted in the same market report. *A bond is a corporation's note.*

Page 197 ; 313

3. A 4% bond pays \$4 on a bond whose face value is \$100. When bought at \$50 the income is $\frac{4}{50}$ or 8%; at 200 is $\frac{4}{200}$ or 2%; at 120 is $\frac{4}{120}$ or $3\frac{1}{3}\%$, etc.

4. A 4% bond at par makes a 4% income on the investment. A 3% bond at 60 is $\frac{3}{60}$ or 5% on the investment.

5. A 5% bond at 105 is $\frac{5}{105}$ or $4\frac{1}{3}\%$ on the investment.

6. $1\frac{1}{4}\%$ of \$5000 = \$62.50 gained.

7. A quarterly dividend of 12% is \$48 per year on each \$100 share. \$48 on \$640 invested is $\frac{48}{640}$ or $\frac{3}{40}$ or $7\frac{1}{2}\%$ on the investment.

9. \$8 on \$200 is the same as \$6 on \$150. Each yields 4%.

10. The total cost per \$100 = $\$108\frac{3}{4} + \frac{1}{8} = \$108\frac{7}{8}$. Net receipts for \$100 = $\$112\frac{1}{2} - \$\frac{1}{8} = \$112\frac{3}{8}$. Gain = $\$3\frac{1}{8}$. $60 \times \$3\frac{1}{8} = \210 .

11. $\frac{90 \times \$98}{\$110} = 80$ and \$20 remaining.

12. (1) $\$841 - \$118 = \$723$. (2) $\$723$ is $\frac{113}{118}$ of $\$118$. (3) $\frac{113}{118} = 697\frac{1}{3}\%$.

13. (1) $7 \times \$220 = \1540 . (2) $\$1540 - \$1500 = \$40$ in favor of stock.

Pages 198-202; 314-318

What has been said of bank discount is equally true of exchange. The subject should be presented objectively as far as possible.

Page 202; 318

1. May 6 + 60 days = July 5. From May 10 to July 5, 56 d.
2. 56 d. int. of $\$348 @ 6\% = \3.25 ; $\$348 - \$3.25 = \$344.75$.
3. (1) $\frac{1}{4}\%$ of $\$348 = 87¢$. (2) 60 d. int. of $\$348$ at 6% is $\$3.48$. (3) $\$348 - \$3.48 - 87¢ = \$343.65$.
5. The draft should be payable 90 days after sight.
6. (1) From Aug. 18 to Nov. 1 = 75 d. (2) 75 d. int. of $\$500$ at 6% is $\$6.25$. (3) $\$500 - \$6.25 = \$493.75$.
7. $\$500 - 90$ d. int. - $\frac{1}{2}\%$ of $\$500 = \$500 - \$7.50 - \$2.50 = \$490$.
8. $\$4000 - 90$ d. int. = $\$4000 - \$60 = \$3940$.
9. (1) $\frac{1}{2}\%$ of $\$2100 = \10.50 . (2) $\$10.50 - 25¢ = \10.25 .

Page 204; 320

3. (1) $\$24,000$ is $\frac{3}{800}$ of $\$6,400,000$. (2) $\frac{3}{800}$ of $\$40,000 = \150 , my tax.
10. (1) $40,000 @ 2\frac{3}{4}\% = \1100 . (2) $40,000 \times \frac{1}{8}\% = \50 specific. 40% of $\$1100 = \440 *ad valorem*. Total cost, $\$1100 + \$50 + \$440 = \1590 .

11. (1) $126 + 3\frac{1}{2} = 129\frac{1}{2}$, total receipts. (2) $129\frac{1}{2} - 128\frac{3}{4} = \frac{1}{4}$, gain. (3) $19 \times \frac{3}{4} = \14.25 , gain.
12. (1) 2% of $\$50,000 = \1000 , com. for selling.
 (2) $1\frac{3}{8} \times \$49,000 = \960.78 , com. for buying. (3) Total, $\$1960.78$.
13. (1) $500 \times \$5.62\frac{1}{2} = \2812.50 , the cost.
 (2) 122% of $\$2812.50 = \3431.25 , selling price.
 (3) 5% of $\$3431.25 = \171.56 , loss in bad debts.
 (4) $500 \times 25\text{¢} = \125 , for storage.
 (5) Losses and expenses, $\$171.56 + \$125 + \$32.60 = \329.16 .
 (6) $\$3431.25 - (\$2812.50 + \$329.16) = \289.59 .
14. (1) Amt. of a 6-mo. note of $\$500$ at 6% = $\$515$.
 (2) Int. of $\$515$ for 40 d. at 6% = $\$3.43$. Proceeds = $\$511.57$ (without grace).
15. (1) $5\% - 3\frac{1}{2}\% = 1\frac{1}{2}\%$. (2) $1\frac{1}{2}\%$ of $\$5000 = \75 .
16. 20% or $\frac{1}{5}$ the cost = $\$100$, therefore the cost = $\$500$.

Page 205; 321

2. (1) 95% of 72 qts. = 68.4 qts.
 (2) $7\frac{1}{2}\%$ of 68.4 qts. = 5.13 qts.
3. (1) $12 \times 22\frac{1}{2}d = 270d = £1\frac{1}{4}$.
 (2) $£1\frac{1}{4} = \$5.4748$.
4. (1) $6\frac{2}{3}\%$ of $\$18,000,000 = \$1,215,000$, premium.
 (2) $3\frac{1}{3}\%$ of $\$18,000,000 = \$600,000$, income.
 (3) $\frac{3\frac{1}{3}}{106\frac{2}{3}} = 3.278+\%$.
5. Loss, $\$407.88$. 6. $\frac{23000 - 16500}{23000} = 28\frac{2}{3}\%$.

7. Since \$640 is 128% of the cost, \$728 is $\frac{128}{100}$ of 128% of the cost. $\frac{128}{100} \times 128\% = 145\frac{1}{2}\%$ of the cost or a gain of $45\frac{1}{2}\%$.

8. Since \$1110 was gained and this is 37% of the loss, then the net loss is 63% of the loss on the last transaction.

$$\frac{37}{100} \times \$1110 = \$1890, \text{ or } (1) \$1110 = 37\% \text{ of } \$3000.$$

$$(2) \$3000 - \$1110 = \$1890.$$

9. $\frac{100}{2\frac{1}{2}} \times \$126,000 = \$4,800,000.$

10.	1st offer.	2d offer.
	5)\$546.84	4)\$575.30
	109.37	143.83
	<hr/>	<hr/>
	20)437.47	10)431.47
	21.87	43.15
	<hr/>	<hr/>
	net cost = \$415.60	\$388.32
	388.32	
	<hr/>	
	\$27.28 in favor of 2d offer.	

Page 206; 322

There is little new in proportion when introduced at this time except the manner of expressing the ratio. From the third year the pupil has made use of ratio and the equality of ratios in the solution of problems. "If 6 oranges cost 20 cents, find the cost of 3, of 9, of 12," etc., given in the third year were solved in this way.

When the known ratio is an integer time is saved by solving as throughout the course.

Page 207; 323

2. 60 bu. : 25 bu. = \$36 : \$x expresses the truth that the ratio of the quantities is the same as the ratio of the costs; but before

using a term for multiplier it must be concrete, hence we write the abstract ratio of the quantities or

$$60 : 25 = \$36 : \$x$$

$$\$x = \frac{25 \times \$36}{60} = \$15.$$

In the preceding years we should have said 25 is $\frac{1}{3}$ of 60.
 $\frac{1}{3}$ of \$36 = \$15.

$$3. \quad 7 : 18 = \$147 : \$x. \quad \$x = \frac{18 \times \$147}{7} = \$378.$$

Page 208; 324

$$5. \quad 36 : 27 = 12 \text{ days} : x \text{ days. } x = 9.$$

Or observe that it will take 36 men just $\frac{3}{4}$ as long as 27 men; hence it will take $\frac{3}{4}$ of 12 days or 9 days.

$$6. \quad 2700 : 2100 = 9 \text{ mos.} : x \text{ mos. } x = 7. \quad \text{Or provisions will last 2700 men } \frac{7}{9} \text{ as long as they will last 2100 men. } \frac{7}{9} \text{ of 9 mos.} = 7 \text{ mos.}$$

$$7. \quad 4\frac{1}{8} : 19\frac{1}{2} = \$2\frac{1}{8} : \$x. \quad x = \$11.50.$$

$$8. \quad 3\frac{3}{4} : 4\frac{5}{8} = \$27.50 : \$x. \quad x = \$33.92.$$

$$9. \quad 108 : 72 = 288 \text{ men} : x \text{ men. } x = 192; 288 - 192 = 96, \text{ taken sick.}$$

$$10. \quad \frac{1}{2} \text{ of } \frac{5}{8} : x = 2\frac{3}{8} : 1. \quad x = \frac{1}{1\frac{1}{2}} \times \frac{1}{2} \times \frac{5}{8} = \frac{5}{12}.$$

$$11. \quad 4.50 : 6.00 = x \text{ oz.} : 6 \text{ oz. } x = 4\frac{1}{2}.$$

$$12. \quad 12 : 18 = 112 \text{ men} : x \text{ men. } x = 168. \quad 168 - 112 = 56, \text{ the required number.}$$

$$13. \quad 5 : 4 = \$6 : \$x. \quad x = \$4.80.$$

Page 209; 325

The analysis is so simple in the following that the work only will be indicated. When possible the known ratio is obtained without a pencil.

2. $11 \times 5\frac{1}{2} \text{ d.} = 60\frac{1}{2} \text{ d.}$
3. $17\frac{4}{5} \div 7\frac{1}{2} = 2\frac{68}{35}$
4. $9 \times \$91 = \819
5. $90 \times 90 = 8100$
6. $8 \times 14 \text{ ft.} = 112 \text{ ft.}$
7. $\frac{8}{3} \times 105 \text{ m.} = 126 \text{ m.}$
8. $105 \text{ m.} + 126 \text{ m.} = 231 \text{ m.}$
9. $3 \times 320 \text{ bu.} = 960 \text{ bu.}$
10. $\frac{1}{2} \text{ of } \$6.80 = \$3.40$
11. $1\frac{5}{6} \times 6 \text{ bbls.} = 11 \text{ bbls.}$

Page 210; 326

3. $\frac{5}{8} \text{ of } \$3 = \$2.50$
4. $6 \times \$3 = \18
5. $\frac{4}{3} \times 36 \text{ yds.} = 48 \text{ yds.}$
6. $\frac{1}{3} \text{ of } 42 = 14$
7. $\frac{3}{4} \times 30 \text{ d.} = 22\frac{1}{2} \text{ d.}$
8. $1\frac{5}{6} \times 24 \text{ men} = 18 \text{ men.}$
9. $1\frac{1}{3} \times \$94.50 = \126
10. $4\frac{1}{2} \times 70 \text{ min.} = 315 \text{ min.} = 5\frac{1}{4} \text{ hrs.}$
11. $1\frac{1}{2} \times 15 \text{ d.} = 22\frac{1}{2} \text{ d.}$
12. $4\frac{7}{8} \times 1000 \text{ m.} = 4285.71 \text{ m.}$
13. $1\frac{2}{3} \text{ to } 2\frac{2}{3} = 1\frac{2}{3}$. $1\frac{2}{3} \times \$23.10 = \133.35
14. $546 \div 22\frac{3}{4} = 24$, the number of acres.

Page 211; 327 Powers and Roots

Observe the development of the text. The pupil should discover the law governing the square and from it reverse the process and extract the square root. Observe the development on page 213; 329. It may be well to tell the class that the process is the same for any number of root figures and omit the development on page

214; 330. After the pupil has discovered the process it may be formulated as on page 217; 333.

Page 220; 336

1. Since the altitude divides the triangle into two equal right triangles with hypotenuse 10 and base 6, the altitude is $\sqrt{100 - 36} = 8$.

2. $\sqrt{100 - 25} = \sqrt{75} = 8.66+$.

3. $\sqrt{22^2 + 10^2} = 24.16+$.

4. $\sqrt{25^2 - 12^2} = \sqrt{481} = 21.93+$.

5. (1) Alt. $= \sqrt{400 - 64} = 18.33$. (2) $18.33 \times 4 = 73.32+$.

6. (1) Alt. $= \sqrt{24^2 - 12^2} = 20.78+$.

(2) Area $= 20.78 \times 12 = 249.36+$.

7. (1) 5 A. $= 800$ sq. rds.

(2) $\sqrt{800} = 28.28$, the no. of rds. in 1 side.

(3) 4×28.28 rds. $= 113.12$ rds., the perimeter.

(4) 113.12 rds. @ \$1.25 $=$ \$141.40.

9. (1) Alt. of each triangle $= \sqrt{100 - 25} = 8.66$.

(2) Area of each triangle $= 5 \times 8.66 = 43.30$.

(3) Area of the hexagon $= 6 \times 43.3 = 259.8$, the no. of sq. in.

Page 221; 337

2. $\sqrt{25^2 + 16^2} = 29.67 +$. 3. $\sqrt{42^2 - 30^2} = 29.4$.

4. (1) Since the length is twice the width, 6 times the width is the perimeter or 36 ft. Therefore it is 6 by 12.

(2) $\sqrt{12^2 + 6^2} = 13.4$.

5. Since 32 is the square of one side, the square of the diagonal is 64 or the diagonal is $\sqrt{64}$ or 8.

6. $\sqrt{30^2 - 16^2} = 25.37+$.
 7. $\sqrt{48^2 + 48^2} = 67.8+$.
 8. $3.1416 \times 18^2 = 1017.8784$.
 9. $24.3474 \div 3.1416 = 7.75$, the square of the radius.
 $2 \times \sqrt{7.75} = 5.56$, the diameter.
 10. $\sqrt{275^2 - 50^2} = 270.4+$. 12. (1) $\sqrt{12^2 + 12^2} = 16.97$.
 11. $\sqrt{15^2 + 10^2} = 18.02+$. (2) $16.97 + 1. = 17.97$.

Page 222 ; 338

1. $\sqrt{24 \times 2} = 6.9282$. 2. $\sqrt{32^2 + 30^2} = 43.863$.
 3. (1) $\sqrt{48 \times 12} = 24$, the length of one side of the square.
 (2) $4 \times 24 = 96$, the perimeter of square.
 (3) $2 \times (48 + 12) = 120$, the perimeter of rectangle.
 $120 : 96$ is 5 : 4.
 4. (1) $\sqrt{1296} = 36$. (2) $2 \times 36 = 72$, two sides.
 (3) $\sqrt{36^2 + 36^2} = 50.911$. (4) $72 - 50.911 = 21.089$.
 5. (1) 1 A. = 160 sq. rds. (2) $\sqrt{160} = 12.649$, the no. of rds.
 12.649 rds. = 208.71 ft.
 6. $\sqrt{48^2 + 85^2} = 97.616$ ft.
 7. (1) $S^2 + S^2 = 90^2$. (2) $S^2 = \frac{90^2}{2} = 4050$.
 (3) $S = \sqrt{4050} = 63.639$.
 8. (1) $80 - 60 = 20$. (2) $\sqrt{100^2 + 20^2} = 101.98$.
 9. (1) $3888 \div 3 = 1296$, the no. of sq. ft. in each of the 3 squares.
 (2) $\sqrt{1296} = 36$, the short side; 108 = the other.
 10. $\sqrt{24^2 - 12^2} = 20.78$. 11. $\sqrt{50^2 - 42^2} = 27.12$ ft.
 12. $12^2 - \frac{1}{2}$ of $4 \times 4 = 136$.

13. (1) $\sqrt{1500^2 + 1800^2} = 2343.074$.
 (2) $2343.074 + 25 = 2368.074$.
14. (1) $\sqrt{200^2 + 75^2} = 213.6$. (2) $275 - 213.6 = 61.4$.

Page 225; 341

1. $10 \times 1\frac{2}{3} \times 1\frac{2}{3}$ cu. ft. $+ \frac{2}{3} \times 1\frac{2}{3} \times 1\frac{2}{3}$ cu. ft. $= \frac{2}{3}^3 \times \frac{4}{3} \times \frac{4}{3}$ cu. ft. $= 29\frac{1}{3}$ cu. ft.
3. (1) Alt. $= \sqrt{15^2 - 5^2} = 14.142$. (2) Vol. $= \frac{1}{3} \times 100 \times 14.142 = 471.4$, the no. of cu. in.
4. $24 \times 62\frac{1}{2} = 1500$, the no. of cu. in.
5. $2 \times 2 \times 10 \times 165$ lbs. $= 6600$ lbs.
10. $\frac{1}{2}^2 \times (4 + 4 + 4 + 4)$ sq. in. $= 96$ sq. in.
11. $\frac{16 \times 48}{2}$ sq. in. $= 384$ sq. in.
12. (1) Slant height $= \sqrt{6^2 - 3^2} = 5.196$. (2) $\frac{2}{3}^2 \times 5.196 = 62.352$, area.
13. $\frac{1}{3}^2 \times 12 \times 12$ cu. in. $= 720$ cu. in.
14. (1) Slant height $= \sqrt{15^2 + 6^2} = 16.15$, the no. of inches.
 (2) Convex surface $= \frac{2}{3}^2 \times 16.15 = 387.6$, the no. of sq. in.

Page 227; 343

8. Since the area of a circle is the circumference by $\frac{1}{2}$ the radius, any sector of a circle is its arc by $\frac{1}{2}$ the radius. Cut into small sectors as in the development of the area of a circle.
9. $\frac{10 \times 8}{2} = 40$, the no. of sq. in.

10. (1) Slant height $= \sqrt{4^2 + (\frac{3}{2})^2} = 4.27$. (2) $3 \times 3.1416 = 9.4248$ the perimeter of the base. (3) $\frac{4.27}{2} \times 9.4248 = 20.1219$, the number of sq. ft.

11. (1) Perimeter of base $= 7 \times 3.1416 = 21.9912$.

(2) Convex surface $= \frac{\pi}{2} \times 21.9912 = 54.978$.

(3) Area of base $= \frac{\pi}{4} \times \frac{\pi}{4} \times 3.1416 = 38.4846$.

(4) Total area $= 93.4626$.

12. $10 \times 7 \times 3.1416 = 219.912$.

13. (1) Slant height $= \sqrt{15^2 + 6^2} = 16.15$.

(2) Perimeter of base $= 12 \times 3.1416 = 37.6992$.

(3) Convex surface $= 37.6992 \times \frac{16.15}{2} = 304.42$ sq. ft.

(4) $304.42 + 5\%$ of same $= 319.62$ sq. ft. $= 35.51$ sq. yds.

Page 230; 346

1. $\frac{3}{4} \pi$ to $2^3 = \frac{3.1416}{6} = 0.5236$.

2. (1) $3^3 = 27$, volume of cube.

(2) $\frac{3}{4} \times 3.1416 \times (\frac{3}{2})^3 = 14.1372$, volume of sphere.

(3) $\frac{14.1372}{27} = 0.5236$, part of cube in sphere.

(4) $1 - 0.5236 = 0.4764$, part in shavings.

3. The contents of a sphere $= D^3 \times 0.5236$. (See page 229; 345, Ex. 9.) $4^3 \times 0.5236 = 33.5104$.

4. $450 \times 0.5236 = 235.62$.

5. $4 \times (\frac{1}{4})^3 \times 0.5236 \times 114$ lbs. $= 1.105$ lbs.

6. $\frac{3}{4} \pi (1000)^3 = 4,188,800,000$.

7. $\frac{4}{3} \pi (4000)^3 \div \frac{4}{3} \pi (1000)^3 = 64.$
8. $2 \times \frac{4}{3} \pi \times 2^3 = 67.0208$, the number of cu. in.
9. $\pi \times 6^2 = 113.0976$ sq. in.
10. $\pi \times (2000)^2 = 12,566,400.$
11. $\frac{4}{3} \times \pi \times (\frac{3}{2})^3 \times 19\frac{2}{3} \times \frac{1}{2} = 9.715$ lbs. avoird.
12. $(4 \times \pi \times 2^2) \div 4 \times \pi \times (\frac{3}{2})^2 \times \$3 = \$5\frac{1}{2}.$
13. $(\frac{4}{3} \times \pi \times 3^3) \div (\frac{4}{3} \times \pi \times 1^3) \times 18 \text{ oz.} = 486 \text{ oz.}$

Page 233; 349

3. $9 \times \$300 = \$2700.$ 4. $2^2 : 3^2 = 4 : 9.$
5. $\frac{3^2}{2^2} \times \$8.25 = \$18.56.$
6. (1) $(\frac{3}{4})^2 : (\frac{5}{8})^2 = \frac{3}{5}.$ (2) $\frac{3}{5} \times 20 \text{ min.} = 12 \text{ min.}$
7. Altitudes have the ratio $\sqrt{25}$ or 5.
8. (1) 45 to 30 = $\frac{3}{2}.$ (2) $(\frac{3}{2})^2 \times \$35 = \$78.75.$
9. (1) 20 to 16 = $\frac{5}{4}.$ (2) $(\frac{5}{4})^2 \times \$13.50 = \$21.09.$
10. (1) 6 to 2 = 3. (2) $3^3 \times 1 \text{ lb.} = 27 \text{ lbs.}$
11. (1) $12\frac{1}{2}$ to 5 = $\frac{5}{2}.$ (2) $(\frac{5}{2})^3 \times 75 \text{ bu.} = 1171.875 \text{ bu.}$
12. (1) 14 to $3\frac{1}{2}$ = 4. (2) $4^3 \times 90 \text{ min.} = 96 \text{ hrs.}$

Page 237; 353

1. (1) Perimeter of room, 22 yds.
 (2) $3 \times 22 \text{ sq. yds.} = 66 \text{ sq. yds., area of walls.}$
 (3) $\frac{2}{3}$ of 66 sq. yds. = 44 sq. yds.
 (4) $6 \times 5 \text{ sq. yds.} = 30 \text{ sq. yds., area of ceiling.}$
 (5) Total amt. plastered = $(44 + 30) \text{ sq. yds.} = 74 \text{ sq. yds.}$
 (6) $74 \times \$\frac{1}{8} = \$9.25.$

2. (1) $\text{Alt} = \sqrt{60^2 - 25^2} = 54.544$
 (2) $\frac{1}{2} \times 54.544 = 681.8$.
3. (1) $5 \text{ A.} = 800 \text{ sq. rda.}$
 (2) $800 \div 50 = 16$, the no. of rda. in width.
5. (1) Perimeter of one base 24 in. or 2 ft. (2) Of the other 32 in. or $2\frac{2}{3}$ ft.
 (3) $\frac{18 \times (2 + 2\frac{2}{3})}{2} = 42$, number of sq. ft. (4) $4 \times 8 \text{ sq. in.} = 32 \text{ sq. in.}$ $4 \times 12 \text{ sq. in.} = 48 \text{ sq. in.}$
 (5) Total, 42 sq. ft. and 80 sq. in.
6. $22\frac{1}{2} \times 8 + 22\frac{1}{2} \times 6 = 14 \times 22\frac{1}{2} = 315$, the no. of sq. ft.
7. $\frac{28 \times 2 \times 18 \times \$32}{1000} = \$32.26$.
8. (1) $\frac{1}{2} (\pi \times 9^2 - \pi \times 6^2) = 70.686$. (2) $3 \times (12 + 6) = 54$
 (3) $70.686 + 54 = 124.686$, area in sq. ft.
9. $\frac{\pi \times 3\frac{1}{2}}{\pi \times 4} \times 1000 = 875$.
10. $4 \text{ ft.} \div 3.1416 = 1.27324 \text{ ft.}$
11. (1) $\frac{4\frac{1}{2}}{16} \times 8 \times 4 \text{ sq. ft.} = 9 \text{ sq. ft.}$
 (2) $\sqrt{9} = 3$, the side of square.
12. (1) A cord of 4 ft. wood 2 ft. high covers 64 sq. ft.
 (2) 12 cords cover $12 \times 64 \text{ sq. ft.} = 768 \text{ sq. ft.}$
13. $\frac{4}{3} \pi = 4.1888$.

1. (1) $1728 \div (8 \times 4 \times 2) = 27$, the number in 1 cu. ft.
 (2) $\frac{1000}{27} \times 27 = 1080$.

2. $\frac{1}{3}$ of $(6 \times \pi \times 1^2) = 2\pi = 6.2832$.
3. Slant height $= \sqrt{12^2 + 4^2} = 12.65$, no. of inches.
4. $2\pi (\frac{1}{2})^2 + \pi (\frac{1}{2})^2 = 3\pi (\frac{1}{2})^2 = 530.145$.
5. $2\pi 3963.296 = 24,902.18$.
6. (1) $2(60 + 30)$. (2) $4\sqrt{60 \times 30}$. (3) $(2\sqrt{1800 \div \pi}) \times \pi$.
7. $\frac{1}{27}$ of $20 \times 16 \times 8 = 94.81$, no. cu. yd.
8. $\pi \times (\frac{1}{3})^2 \times 76 = 26.529$. 9. $2^2 : (1\frac{1}{2})^2 = 64$ to 49.
10. $\left(\frac{3\frac{1}{2}}{2}\right)^3 \times 300 \text{ lbs.} = 1607.8125 \text{ lbs.}$
11. (1) $1728 \times \frac{2150.42}{144} \text{ cu. ft.} = 2150.42 \text{ cu. ft.}$
(2) $2150.42 \div 144 = 14.9384$, the depth in ft.
12. $\frac{18 \times \pi \times 8^2}{128} = 28.2744$.
13. $\frac{3}{4} \times 8000 \text{ lbs.} = 18,000 \text{ lbs.}$
14. $\pi \times 15^2 = 706.86$, area in sq. ft.

Page 244; 360

1. (1) $847.2 \text{ kg.} = 1000 \times 847.2 \text{ g.} = 847,200 \text{ g.}$
(2) $847.2 \times 2.20462 \text{ lbs.} = 1867.75 \text{ lb.}$
2. $75 \times 0.3524 \text{ hl.} = 26.43 \text{ hl.}$
3. $180 \times .092903 \text{ sq. m.} = 16.72 \text{ sq. m.}$
4. $1200 \times \frac{32.808}{3} \text{ yds.} = 1312.3 + \text{ yds.}$
7. (1) $250 \times \$0.75 = \187.50 , the cost.
(2) $250 \times \frac{1.0527}{4} \times \$3 = \$198.13$, the selling price.
(3) $\$198.13 - \$187.50 = \$10.63$ gain.

8. Since the weight is to be found in kg., the vol. should be found in cubic decimeters. $10 \times 5 \times 2.4 \times 8 \text{ kg.} = 960 \text{ kg.}$

9. $196 \div 2.20462 = 88.9+$, the number of kg.
11. $0.2759 \times \$12 = \3.31 .
12. (1) 40 dm. = 4 hm.
 (2) $4 \times 14 = 56$, the number of hectares.
 (3) $56 \times 2.471 \text{ A.} = 138.38 \text{ A.}$
13. 1 cu. m. = 1000 l. = 1056.7 qts. = 264.17 gal.
14. (1) 1.28 km. = 12,800 dm. (2) $12,800 \text{ dm.} \div 16 \text{ dm.} = 800$.
15. $\frac{5}{4} \times \frac{20.37}{3.8} \times \$2.35 = \$3.21$.
16. $\frac{100}{32} \times 63 \text{ kg.} = 196.875 \text{ kg.}$
17. $60,000 \times 12.5 \text{ cm.} = 750,000 \text{ cm.} = 7500 \text{ m.}$
18. $5.39 \times 1.736 \times 0.526 \times 2.83 = 13.928694$.
19. $7.25 \div (0.52 \times 1.73 \times 4.3) = 1.9$.

Page 251; 367

1. $800 \times \$75 = \$60,000$.
2. (1) 95% of asking price = \$190; therefore he asked \$200.
 (2) $\frac{190}{200} \times \$200 = \160 , the cost.
3. (1) \$250 net income on \$3000 = $\frac{1}{12}$ of the investment or $8\frac{1}{3}\%$.
4. $\frac{105}{3\frac{1}{2}} \times \$700 = \$21,000$.
5. $\frac{1}{2}$ is 6 times $\frac{1}{12}$; therefore the line will be 6 inches long.
6. (1) $\frac{1}{3} \times 75 \times \$3.50 - \$15 = \195 , the price of 75 bu. in the fall.
 (2) $\$195 \div 75 = \2.60 , price per bu. in the fall.
7. $28 \times 4 \times 4 \times 3\frac{1}{2} \times \frac{10\cancel{c}}{100} = \1.57 .

8. $\frac{3}{4} \times 24,000 = 67,200$.
9. (1) $\frac{7}{8} - \frac{1}{4} = \frac{3}{8}$, the part gained on $\frac{1}{4}$.
 $\frac{3}{8}$ gained on $\frac{1}{4} = \frac{3}{2} = 8\frac{1}{2}\%$.
10. $\frac{1}{10} \times 940 = 94$, the number of bbls.
11. 500 lbs. gained on 1500 sold $= \frac{1}{3}$ or $33\frac{1}{3}\%$.

Page 252; 368

- I. $\frac{1041}{5} \times \$1600 = \$33,360$.
2. (1) Total int. = \$46. (2) Int. for 1 yr., \$30. (3) Time $= \frac{3}{4}$ yr. $= 1\frac{3}{4}$ yr. $= 1$ yr. 6 mos. 12 d. June 10, 1902, + 1 yr. 6 mos. 12 d. = Dec. 22, 1903.
3. (1) Due Oct. 5, 1903. (2) Term of discount, July 15 to Oct. 5 = 82 days.
 (2) Int. of \$150 @ 5% for 82 d. = \$1.71. Proceeds = \$148.29.
4. (1) Oct. 5 to Mar. 27 = 5 mos. 22 d. (2) Int. of \$150 at 5% for 5 mos. 22 d. = \$3.58. (3) Amt. = \$153.58.
5. (1) \$24 - \$16.25 = \$7.75. (2) \$279 \div \$7.75 = 36.
6. (1) $2000 \times \$5\frac{1}{2} = \$11,000$. (2) $\frac{1}{2}\%$ of \$11,000 = \$55.
 (3) \$55 + \$74 + \$27 = \$156. (4) \$11,000 - \$156 = \$10,844.
7. (1) $\frac{1}{10} \times \$50 = \70 , the selling price. (2) $\frac{1}{4} \times \$70 = \80 , the asking price.
8. $3 \times 4 \times \sqrt{3136} = 672$.
9. (1) $20 \times 4 \times \sqrt{6561} = 6480$, the no. of sq. ft.
 (2) $\frac{1}{8}$ of 6480 = 720, the no. of sq. yds. or the no. of yds. of burlap. (3) $720 \times 15¢ = \$108$. (4) Int. of \$108 for 10 mos. 18 d. at 5% = \$4.77. (5) Amt. = \$112.77.

10. (1) Due, Feb. 23. (2) Term of dis. from Dec. 19 to Feb. 23 = 66 d. (3) \$350 at 6% for 66 d. = \$3.85. (4) Proceeds = \$346.15.

$$11. 80 \times 3.1416 \times \left(\frac{1}{2}\right)^2 \times \frac{17.31}{231} = 105,753.6.$$

Page 253; 369

$$1. \frac{100}{95} \times \$76 = \$80. \quad 2. \frac{400}{300} \times \$13.50 = \$18.00.$$

$$3. (1) \frac{10}{90} \times \$16.50 = \$1.88.$$

$$4. (1) \text{Cost per lb} = \frac{\$4.65}{2240} \quad (2) \text{Selling price} = \frac{\$8}{2000}$$

$$\left(\frac{\$8}{2000} - \frac{\$4.65}{2240} \right) \div \frac{\$4.65}{2240} = 862 \div 930 = 92\frac{2}{3}\%.$$

$$5. \left(\frac{100}{100} \times \$2000 \right) \div \$1.50 = 1282\frac{1}{2}, \text{ no. of bbls.}$$

$$6. \frac{1}{800} \times 85 \times \$5 = \$0.55.$$

$$7. (1) \text{Income on 80 shares of } 5\% \text{ stock} = \$400.$$

$$(2) (80 \times \$72) \div \$108\frac{1}{2} = 58 \text{ and } \$19 \text{ remaining.}$$

$$(3) 58 \text{ shares of } 8\% \text{ stock} = \$424, \text{ income.}$$

$$(4) \$424 - \$400 = \$24, \text{ increase.}$$

$$8. 4.780 \times \$16.30 = \$77.91.$$

$$9. (1) \frac{200}{100} \times \$360 = \$96,000, \text{ the buying price.}$$

$$(2) \$96,000 + \$4500 = \$100,500, \text{ selling price.}$$

$$(3) 1\frac{1}{4}\% \text{ of } \$100,500 = \$1256.25, \text{ the com.}$$

$$(4) \text{Proceeds} = \$99,243.75.$$

$$10. 6 \times \frac{100}{100} \times 2184 = 12,480, \text{ the no. of lbs.}$$

$$11. \frac{400}{100} \times \$275,000 = \$22,000,000.$$

$$12. \frac{3}{4} \times \frac{10}{100} \times \frac{100}{100} \times \$50 = \$32.40.$$

13. (1) $\frac{1}{8}$ of 576 = 96, the area of one face.
 (2) $\sqrt{96}$ = one edge. (3) $96\sqrt{96}$ = 939.84.
 14. Exact int. = $\frac{171}{365} \times \frac{6}{100} \times \$250 = \$7.03$.

Page 254; 370

- I. $3 \times \$126\frac{2}{3} = \379.88 .
 2. (1) Selling price of 90 = \$3.00. Gain = \$1.50 on \$1.50 invested or 100%.
 3. (1) 6% for 90 d. = $1\frac{1}{2}\%$. 4. $1\frac{1}{10} \times \frac{3}{4} \times \$7500 = \$200$.
 (2) $\frac{100}{98\frac{1}{2}} \times \$492.50 = \$500$. 5. $\frac{1}{3}$ and $\frac{1}{4}$.
 6. $\frac{1}{3} + \frac{1}{4} = \frac{7}{12}$, the part done in 1 d. $\frac{1}{3} \div \frac{7}{12} = 1\frac{1}{7}$, the no. of days required.
 7. (1) $\frac{1}{10} + \frac{1}{12} = \frac{11}{60}$, the part done in 1 hour. (2) $\frac{11}{60}$ or $5\frac{1}{12}$ = no. of hours.
 8. (1) $\frac{1}{8} + \frac{1}{8} + \frac{1}{12} = \frac{9}{24}$, part in 1 d. (2) $\frac{2}{3} = 2\frac{2}{3}$ = the no. of days.
 9. (1) $\frac{1}{4} - \frac{1}{8} = \frac{1}{8}$, the part 1 man can do in 1 d. (2) 12 days = time to paint it.
 10. (1) $200 \times 90 = 18,000$, no. of sq. ft. in all.
 (2) $24 \times 42 + 14 \times 20 = 1280$, part covered by house.
 (3) $18,000 - 1280 = 16,720$, part not covered by house.
 (4) $1\frac{2}{3} \times 8$ ft. = $13\frac{1}{3}$ ft. = 7.3 in.
 11. (1) $5\frac{1}{2}\%$ of \$15,000 = \$825, int. (2) $1\frac{2}{3} \times \$15,000 =$
 \$800. (3) $\$825 - \$800 = \$25$, in favor of int.
 12. Time, 10 mos. 26 d. Int., \$19.90. Amt., \$647.90.

Page 255; 371

1. *Ans.* \$11,848.80. 2. *Ans.* 578 $\frac{1}{2}$. 3. *Ans.* \$4649.80.
4. $\frac{288}{100} \times 80\% = 106\frac{2}{3}\%$, or a gain of $6\frac{2}{3}\%$.
5. *Ans.* \$8854.17. 6. *Ans.* \$2172.50.
7. $\text{Alt.} = \sqrt{50^2 - 25^2} = 43.30$, no. of ft.
8. (1) $18.6 \times \$16.70 = \310.62 .
(2) Amt. of \$310.62 for 3 mos. at 7% = \$316.06.
9. *Ans.* 25%. 10. *Ans.* \$55.36.
11. $\frac{115}{100} \times \$240 = \345 . 12. *Ans.* \$905.42.

Page 256; 372

1. First is a discount of $\frac{1}{3}$, the second of $\frac{1}{4}$.
2. *Ans.* \$767.83.
3. (1) 60 rds. = perimeter. (2) 15×15 or 225 sq. rds. = area.
(3) $\frac{225}{100} \times \$1600 = \2250 .
4. (1) 50¢ = cost plus duty = $\frac{4}{5}$ of the cost.
(2) $\frac{4}{5}$ of 50¢ = 40¢, the cost.
5. $\frac{3}{8}$ of 50 m. = 30 m.
6. (1) $107\frac{1}{2}\%$ of \$800 = \$860. (2) $\$860 - \frac{1}{4}$ of 7% of \$860 = \$844.95.
7. *Ans.* $16\frac{2}{3}\%$.
8. $\frac{1}{7} \times \frac{1}{9} \times \frac{1}{3} \times \$23.94 = \$59.63$.
9. $\frac{4 \times 2\frac{1}{2}}{5 \times 1\frac{1}{4}} \times \$2940 = \$4704$.
10. (1) The square of one side is $\frac{1}{2}$ of 648 or 324.
(2) $\sqrt{324} = 18$, the length in ft.
(3) 8 = no. of strips each 6 yds. long.
(4) $8 \times 6 \times 90¢ = \43.20 .

11. Since 3% of the face value is to be 7% of the investment the price must be $\frac{3}{7}$ of \$100 or \$42.86 for a \$100 share.

12. $6\% \text{ of } \$500 \div (\$500 - \$492.50) = \frac{1}{2}$, or 3 mos.

13. $100\% \div 8\% = 12\frac{1}{2}$, no. of years.

14. *Ans.* 6.836 in.

Page 257; 373

1. (1) $\frac{3}{4}$ of $\frac{2}{3} = \frac{2}{3}$, left. (2) $\frac{3}{4} \times \$440 = \1711.11 , at first.

2. $\frac{\$11}{\$8} \div \frac{\$8}{\$8} = 8 \times 9 \div 9 \times 11 = \frac{8}{11}$, no. of gal.

3. (1) $\frac{7}{35} + \frac{5}{35} = \frac{1}{5}$. (2) $\frac{7}{12}$ of 480 gal. = 280 gal.
(3) $\frac{5}{12}$ of 480 gal. = 200 gal.

4. $\frac{294\frac{1}{2}}{13\frac{3}{8} \times 6} = 3\frac{3}{4}$. 5. $48 \times 4\frac{1}{2} \times 6\frac{1}{3}$ sq. ft. = 1368 sq. ft.

6. $6 \times 16 \times \frac{3}{4} \times \frac{1}{2} \times \frac{\$40}{1000} = \$5.60$.

7. $(26,250 \div 87\frac{1}{2}) \times (91 - 87\frac{1}{2}) = \1050 .

8. $\pi \times (\frac{100}{2})^2$ to $\pi \times (\frac{50}{2})^2 = 4$ to 1.

9. $\frac{4}{3\frac{1}{2}} = \frac{8}{7} = 114\frac{2}{7}$, or \$114 $\frac{2}{7}$ for a \$100 bond.

10. $\frac{1}{2}$ of $8 \times 160,000 \times \frac{16 \times 22}{64} \div 63,860 = 55$ (m.)

2933 $\frac{1}{3}$ (ft.)

11. $\frac{1}{3} - \frac{1}{12} = \frac{1}{8}$, the part eaten by A in one month. Therefore the whole would have lasted 36 mos.

12. (1) 24 men 2 days = 48 men 1 day.

(2) 14 men 7 days = 98 men 1 day.

(3) $\frac{2}{3} \times 66$ acres = 134 $\frac{2}{3}$ acres.

13. (1) Int. of \$248 for 6000 d. at 6% = \$248.

(2) $\frac{1}{4}$ of \$248 = \$310.

14. $\frac{1}{2} \times \frac{9}{10} \times \$40 = \$28.80$.

Page 258; 374

1. Term of dis. = 2 mos. Bank dis. = \$5. Proceeds = \$595.

3. Since $\frac{1}{4}$ of the sales is profit, $\frac{3}{4}$ of the sales are cost; so the profit is $\frac{1}{4}$ the cost or 25%.

4. $49 : x = x : 196$.

$$x^2 = 49 \times 196.$$

$$x = \sqrt{49 \times 4 \times 49} = 98.$$

5. (1) $\frac{1}{4}$ of \$3.60 = 90¢ gain.

(2) $\frac{1}{3}$ of \$3.60 = \$1 20, gain or 30¢ greater.

6. $\frac{1}{2} \times \frac{7}{8} \times 42¢ = 56¢$. 7. $\frac{1}{2}$ of $\frac{1}{4} \times \$8214 = \222 .

8. $153 \times 231 \div 3.1416 \times 15^2 = 50$, the no. of inches.

9. $\frac{200}{3} \times 25,375 \times 8 \text{ lbs.} = 200,000 \text{ lbs.}$

10. Matures July 9. Term of discount, 56 d. Discount, \$12.06. Proceeds, \$1279.94.

11. (1) Perimeter of sq. lot = $4 \times \sqrt{120 \times 80} = 391.88$.

(2) $\frac{391.88}{400} \times \$320 = \$313.50$.

Page 259; 375

1. (1) $6005 - 40 = 5965$.

(2) $\frac{22}{1} \frac{65}{10} = 149.12\frac{1}{2} = 14,912\frac{1}{2}\%$.

2. (1) 77 lbs. = 1232 oz. (2) $1232 - 1000 = 232$.

(3) $\frac{232}{1232} = 18\frac{1}{4}\%$.

3. $\frac{1}{2} \times 5 \times 3.1416 = 7.854$, no. of sq. ft.
4. *Ans.* \$0.94.
5. *Ans.* \$17.68.
6. *Ans.* \$34.45.
7. (1) $\$2655 \div \$88\frac{1}{2} = 30$ times and \$7.50 remaining.
 (2) Income from 30 shares = \$105.
 (3) 30 shares @ \$93 = \$2790.
 (4) $5\frac{1}{2}\%$ of \$2790 = \$146.48. (5) Difference, \$41.48.
8. $\$287,000 \div (10,500 \times 40 \times 5) = \$0.13\frac{2}{3}$.
9. $\frac{4}{3} \pi 7^3 - \frac{4}{3} \pi (3\frac{1}{2})^3 = 461.8152$.
10. \$4936.60 = proceeds; 83 d. int. of \$5000 @ $5\frac{1}{2}\%$ = \$63.40.

Page 260; 376

1. $\$39\frac{4}{5} \div \$225 = 17\frac{1}{2}\%$.
2. $1\frac{5}{8} = 4\frac{1}{8}\%$; $1\frac{4}{5} = 3\frac{1}{4}\%$; difference, $1\frac{1}{4}\%$.
3. $\frac{2}{3} \times \frac{1}{9} \times \$1016.64 = \$1412$.
4. $\$40250 \div \$1150 = 35\%$.
5. $\$50 + \$1 + \$50 + \$2.02 + \$50 + \$3.06 = \$156.08$.
6. (1) $6750 + 3825 = 10,575$. (2) $\frac{6750}{10575}$ of 100 = 63.8.
 (3) $100 - 63.8 = 36.2$.
7. $\frac{71}{365}$ of 6% of \$81 = \$0.94.
8. $\$73,000 \div \$5,309,090 = \$0.01375+$.
9. (1) $67,300 - 64,900 = 2,400$.
 (2) $2.4 \times \$1.35 = \3.24 .
10. *Ans.* 0.816 ($\sqrt{\frac{2}{3}} = \sqrt{\frac{2}{3}} = \frac{1}{3}\sqrt{6}$).

11. $[(2 \times (64.8 + 36.05) - 4 \times \sqrt{64.8 \times 36.05})] \times \$1.10 = \$9.21.$

12. $\frac{1188}{1000} \times \$19.50 = \$11.55.$

13. (1) $7\% \times \$3000 = \210 , income.

(2) $\frac{180}{100} \times \frac{1}{4} \times \$3000 = \$225$ income, or an increase of \$15.

14. (1) $3 \times 384 = 1152$, sum.

(2) $\frac{1152 + 64}{2} = 608.$ (3) $1152 - 608 = 544.$

Page 261; 377

1. If $\frac{1}{2}$ of the selling price is gained, that is $\frac{1}{2}$ the cost.
 $\$2500 + \frac{1}{2}$ of $\$2500 = \$3125.$

2. $(9 \times 6\frac{3}{4} + 9 \times \frac{1}{8}) \times \$1\frac{3}{4} = \$107.63.$

3. $5280 \div (2 \times 3.1416 \times 2\frac{1}{2}) = 336.13+.$

4. (1) $\$110 - \$2 = \$108$, the tax on property.

(2) $\$108 \div \$0.009 = 12,000$ times, which is the number of dollars of taxable property.

5. $\$120 = \frac{3}{4}$ cost or $\$160.$

$\$120 = \frac{2}{3}$ cost or $\$144.$

Net loss, $\$16.$

6. (1) $(117\frac{1}{8} - \frac{1}{8}) - (114\frac{3}{4} + \frac{1}{8}) = 2\frac{1}{8}.$

(2) $200 \times \$2\frac{1}{8} = \$425.$

7. $26 \times (118\frac{3}{4} - 107\frac{1}{8}) = \$302.25.$

8. $\frac{12}{100} = 4\frac{1}{2}\%$; $\frac{18}{100} = 4\%.$ First is $\frac{1}{2}\%$ better.

9. (1) $\frac{7}{8}$ to $\frac{3}{4}$ is 21 to 32 or $\frac{3}{4}\frac{1}{2}.$

(2) $\frac{3}{4}\frac{1}{2}$ of $\$1.40 = 92\text{¢}.$

10. $\frac{96}{100} \times 625 \times \$0.67 = \$402.$

11. $\frac{39.37 - 36}{39.37} = 9.36\%$.
12. $2 \times 2 \times (145 + 120) \times \frac{5}{8} \times 8\text{¢} = \$56.53.$
13. $\pi 25^2 = 1963.5 \text{ sq. in.}$
14. $(14 \times 21) - \pi 7^2 = 140.0616 \text{ sq. in.}$

Page 262; 378

1. $\frac{2 \times (\frac{2}{3} + \frac{3}{8} \div 2\frac{1}{2} - \frac{5}{12} \times 1\frac{1}{20})}{1 \div (9 - 2 \times 2)} = 2(\frac{2}{3} + \frac{1}{8} - \frac{1}{16}) \div \frac{1}{8} =$
 10 $(\frac{2}{3} + \frac{1}{8} - \frac{1}{16}) = \frac{7}{8}.$
2. (Draw diagram.) $\sqrt{34^2 + 62^2} = 70.71.$
3. (1) $\frac{5}{8} \times \$182 = \208 , cost of second.
 (2) $\frac{4\frac{3}{8}}{5} \times \$208 = \$206.45$, cost of first.
4. Matures March 10. Term of dis., 59 d. Proceeds, \$495.08.
5. *Ans.* \$2984.37. 6. *Ans.* \$16.09 less at 25%.
7. Let $4x =$ length, then $3x =$ width, and $14x$ the perimeter and $x = 7$. Then it is 21 by 28 rds.
 Area $= 21 \times 28 \text{ sq. rds.} = 588 \text{ sq. rds.}$
8. (1) $2 \times \$480 = \960 , the list price. (2) $\$480 = \frac{5}{8}$ of cost.
 (3) $\frac{5}{8}$ of $\$480 = \400 , the cost.
9. *Ans.* 248 $\frac{1}{2}$. 10. *Ans.* \$26.16. 11. *Ans.* \$889.43.
12. *Ans.* \$0.86. 13. *Ans.* \$25,000. 14. $6\frac{2}{3}\%$.

Page 263; 379

1. *Ans.* $\frac{4}{15}.$ 2. $\frac{86 \times 3.1416 \times 12 \times 12}{281} = 70\frac{1}{2}.$

4. $\text{Alt.} = \sqrt{30^2 - 15^2} = 25.98$.
 $\text{Area} = 15 \times 25.98 = 389.7$, the no. of sq. ft.
5. The dealer gets 80% of the list for what cost 60% or gains $\frac{1}{3}$ of his investment or $33\frac{1}{3}\%$.
6. *Ans.* 60%. 7. *Ans.* \$632.10. 8. *Ans.* $66\frac{2}{3}\%$.
9. (1) 4 in. to weather and 4 in. wide = 9 shingles to the sq. ft.
 $9 \times 1750 \times \frac{\$6}{1000} = \$94.50$.
10. $\frac{1}{3} = 80\%$, the buying price, or \$80 for \$100 share.
11. *Ans.* \$640.25. 12. *Ans.* \$450. 13. *Ans.* \$34.31.

Page 264; 380

1. *Ans.* 1.308+. 2. *Ans.* \$518.55. 3. *Ans.* 48 ft.
4. *Ans.* \$555.10. 5. *Ans.* 420.168 times.
6. $6 \times 32 \times 8 \times \frac{1}{2} \times \frac{\$14}{1000} = \$17.92$.
7. *Ans.* \$352.84. 8. $25 \times \$146\frac{1}{2} = \3668.75 .
9. $\frac{100}{4} \times \$1400 = \$35,000$.
10. (1) Since 40 gal. must sell for \$30, and 20 gal. have been sold for \$12.50, 20 more must sell for \$17.50 or $87\frac{1}{2}\%$ per gal.
11. $\frac{97\frac{1}{2}}{4} \times \$2400 = \$58,500$. 12. *Ans.* \$2971.25.
13. Since 20^2 is twice the square of 1 side, the perimeter is $4 \times \sqrt{200} = 56.568$ no. of rods.
14. $\frac{42 \times 35}{160} \times \$37.50 = \$344.53$.

Page 265; 381

1. *Ans.* $\frac{7}{8}$.
2. (1) I receive $\frac{1}{8}$ of $\frac{5}{4}$ of cost or $\frac{5}{32}$ of cost. (2) The net gain is $\frac{1}{8}$ of cost. (3) $\frac{5}{8}$ of \$63.75 = \$340, cost.
3. $8 \times 42 \times 8 \times \frac{1}{2} \times \frac{118}{1000} = \40.32 .
4. $\frac{25 \times \$32}{\$5} = 160$, the number of bbls.
5. $\frac{3}{4} \times 21 \times 16 \times \frac{28}{1000} = \10.75 . 6. \$56.77.
7. Since a rectangle of same dimensions would contain 4 acres or 640 sq. yds., the height must be $640 \div 40$ or 16, no of rods.
8. $\frac{100}{80} \times \$247.38 = \260.40 ; com. \$13.02.
9. (1) The square of one side = area or 1600 sq. rds.
(2) The square on diagonal = 3200.
(3) $\sqrt{3200} = 56.56+$.
10. $\frac{2 \times (12 + 8) \times 6 - 64}{8} \times \$\frac{1}{4} = \$5.50$.
11. $\frac{11}{10} \times \$1850 = \1980.43 .
12. $\frac{3}{4} - \frac{2}{3} = \frac{1}{12} - \frac{1}{12} = \frac{1}{36}$. The gain is $\frac{1}{36}$ on $\frac{1}{36}$ sold or $\frac{1}{4}$ of the investment. $\frac{1}{4} = 7\frac{1}{2}\%$.
13. $\frac{4\frac{1}{2}}{90} = 5\%$.

Page 266; 382

1. (1) $\frac{9}{10}$ of $\frac{3}{11} = \frac{27}{110}$; $\frac{5}{8}$ of $\frac{3}{8} = \frac{1}{2}$.
(2) $\frac{1}{3}$ to $\frac{27}{110} = 110$ to 81 or $\frac{1}{810}$.
(3) $\frac{110}{810} \times \$40,500 = \$55,000$.
2. (1) Cost = $\frac{3}{4} \times \frac{1}{2}$ or $\frac{1}{2}$ of the list price.
(2) Selling price = $\frac{1}{3}$ of the list price.

$$(3) \frac{11}{10} - \frac{1}{2} = \frac{17}{20}.$$

$$(4) \frac{17}{10} \text{ gained on } \frac{1}{2} \text{ of list} = \frac{17}{10} \text{ gained or } 44\frac{1}{2}\%.$$

$$3. \text{ Ans. } 54\frac{2}{3}\%.$$

$$4. \frac{(5280)^2 \times 10}{45 \times 15} = 413,013\frac{1}{3}.$$

$$5. \frac{360 \times 4}{160} = 9, \text{ no. of acres.}$$

$$6. \frac{1}{2} \times \frac{11}{10} \times \$2 = \$2.75.$$

$$7. \frac{8}{4\frac{1}{2}} = \frac{16}{9} = 177\frac{1}{3}.$$

$$8. \frac{100}{88} \times 110\% \text{ of the cost} = 129\frac{1}{7}\% \text{ or } 29\frac{1}{7}\% \text{ above cost}$$

$$9. \frac{8}{9} \times \$48,870 = \$32,580. \quad \frac{100}{32888} = \frac{1}{3}.$$

$$10. \frac{100}{3} = 166\frac{2}{3}.$$

$$11. 30 \times 15 \times 10 \times \frac{1728}{2150.42} = 3616.037, \text{ no. of bushels.}$$

$$12. \frac{1}{2} \times \frac{1}{15} \text{ of the cost} = \frac{1}{30} \text{ of the cost} = 16\frac{2}{3}\%.$$

$$13. \sqrt{27\frac{1}{2} \times 160 \times 2} = 93.81-. \quad 14. \text{ Ans. } \$22.68.$$

$$15. \frac{120}{80} \times \$3460 = \$3460 + \$1730 = \$5190.$$

Page 267; 383

$$1. \text{ Ans. } \frac{2}{3}.$$

$$2. \frac{\$25}{5 \times \$1.25} = 4, \text{ the no. of yds.}$$

$$3. (1) \frac{100 \times 40}{160} = 25, \text{ the no. of acres sold.}$$

$$(2) 25 \text{ is } \frac{1}{2} \text{ of } 50. \quad \frac{1}{2} = 50\%.$$

$$4. \frac{29}{31} \text{ of } 84 = 80.$$

$$5. \text{ Ans. } 154.284 \text{ bu.}$$

6. (1) $\frac{1}{4} \times \frac{1}{2} \times \$1125 = \$140.63$, gain on $\frac{1}{2}$.
 (2) $\frac{1}{8} \times \frac{3}{4} \times \$1125 = \$56.25$, gain on $\frac{3}{4}$.
 (3) $\frac{1}{2} \times \frac{1}{16} \times \$1125 = 56.25$, loss on remainder.
 (4) Net gain = \$140.63.
7. *Ans.* \$5.60. 8. *Ans.* \$90.56. 9. *Ans.* 125%.
10. (1) Cost = $240 \times \$1\frac{3}{4} = \420 .
 (2) Selling price = $\frac{5}{4} \times \$420 = \525 .
 (3) 200 bbls. for \$525 is \$2.62 $\frac{1}{2}$ per bbl.
11. $\frac{5}{4} \times \frac{8}{5} \times \$8 = \$12$.
12. (1) \$1 discounted for 60 d. yields 99¢.
 $\$250 \div \frac{\$99}{100} = 252.53$ times, hence face of note is \$252.53.
13. $\sqrt{100^2 + 75^2} = 125$, no. of ft. 14. *Ans.* \$198.

Page 268 ; 384

2. Cost of 1 doz. = 15¢. Selling price of 1 doz. = 40¢.
 25¢ gained on 15¢ is $\frac{5}{3}$ or 166 $\frac{2}{3}$ %.
3. $12 \times \frac{5}{12} \times 8¢ = 40¢$. (The average width is 5 in.)
4. $\frac{36 \times 24}{160} \times \frac{1}{2} \times \frac{1}{2} \times \$\frac{1}{2} = \$8.27$.
5. $\frac{4\frac{1}{2}}{110} = 4\frac{1}{11}\%$.
6. $\frac{8}{5} \times 20 \times 8 \times 5 \times 29¢ = \371.20 .
7. (1) $\sqrt{10 \times 160} = 40$. (2) $4 \times 40 \times \$\frac{1}{4} = \40 .
8. (1) $\frac{5}{8} \times \$45 = \37.50 , cost of one.
 (2) $\$45 + \$17.50 = \$62.50$, cost of other.
 (3) $\$37.50 + \$62.50 = \$100$, cost of both.
 (4) 105 $\frac{1}{2}$ % of \$100 = \$105.80.

9. *Ans.* \$391.27. 10. *Ans.* \$620.82.
 11. $\frac{1}{3} \times \frac{1}{10} \times \$260 = \$187.20$.
 12. $\frac{100}{80} \times \frac{100}{90} \times \$158.40 = \$220$.

Page 269; 385

1. *Ans.* $32\frac{1}{2}$. 2. $\frac{8}{98} = \frac{1}{12} = 8\frac{1}{3}\%$.
 3. (1) Total income per year = \$480.
 (2) Total expenses = \$172.50.
 (3) Net income = \$307.50.
 (4) $20 \times \$307.50 = \6150 , the cost.
 4. $\frac{43560}{3 \times 88} = 165$.
 5. (1) $\frac{1}{3} \times \frac{1}{3} = \frac{1}{9}$, the part of the cost he received, or a gain of $\frac{1}{9}$ of cost.
 (2) $15 \times \$250.75 = \3761.25 , the cost.
 6. $\left(\frac{160 \times 400}{4 \times 6} - 250 \right) \div 250 = 966\frac{2}{3}\%$.
 7. $[2(16 + 9) \times 6 + 16 \times 9] \times 95\phi = \421.80 .
 8. (1) $\$17\frac{1}{2} \div \$3\frac{1}{4} = 5\frac{1}{2}$, the no. of cords.
 (2) $5\frac{1}{2}$ cords = 704 cu. ft.
 (3) $704 \div (4 \times 32) = 5\frac{1}{2}$, the height in ft.
 9. *Ans.* \$5.47. 11. $75 \times 6\frac{1}{4}\phi = \frac{3}{4} \times 75 \times 8\frac{1}{4}\phi$.
 12. $\frac{2}{3} \times 36\phi = 14\frac{2}{3}\phi$. 13. $\frac{100}{80} \times \$400 = \625 .

Page 270; 386

1. *Ans.* $53\frac{3}{4}$.
 2. $\left(\frac{64 + 32}{2} \right) \times 20 \times \frac{\$7}{100} = \$67.20$.

3. $\frac{36 \times 40 \times 20}{5} \times \frac{\$5}{1000} = \$28.80.$
4. *Ans.* \$17.36. 5. *Ans.* \$51,568. 6. *Ans.* 9929.4.
7. $\frac{30 \times 36 \times 60 \times 4}{231 \times 18} = 62.337+$, the no. of minutes.
8. $\frac{16 \times 12 \times 3.1416 \times 26 \times 26}{231} = 1765.17$, the no. of gal.
9. $(3 \times 8\frac{3}{4} \times 4) \div (30 \times 35) = 105 \div 1050$ or 1 to 10.
10. $\frac{1}{2} \times \frac{1}{4} \times \$14.40 = \$20.$
11. (1) $\frac{1}{2}$ of 5280 = 2640, the no. of ties, worth \$1056.
 (2) $\frac{5280 \times 60}{2240} \times \$29 = \$4101.43.$
 (60 lbs. is the weight in lbs. per foot of two rails.)
 (3) Total = \$5157.43.
12. $\frac{107\frac{1}{2}}{6} \times \$252 = \$4499.25.$

Page 271; 387

1. *Ans.* 0.016 $\frac{2}{3}$.
2. (1) No. of strips = 6 each 5 yds. long; 30 yds. = total
 $30 \times 75¢ = \$22.50.$
 Or (2) 7 strips each 4 yds. long if laid crosswise. $28 \times 75¢ = \$21.$
3. (1) Cost = $\frac{2}{3}$ of $\frac{1}{2}$ of list = $\frac{1}{3}$ of list.
 (2) Selling price = $\frac{1}{3}$ of list.
 (3) $\frac{1}{3} - \frac{1}{2} = \frac{1}{6} - \frac{1}{3} = -\frac{1}{6} = -\frac{1}{6}\%$.
 (4) Since what cost 76 gained 34, the gain is $\frac{3}{4}$ or $\frac{1}{3}$.
 (5) $\frac{1}{3} = 44.74 - \%$.
4. *Ans.* 2473.

5. (1) Selling price of 70 bu. = $\frac{2}{3} \times 100 \times 40¢ = \48 .
 (2) Selling price of 1 bu. = $68\frac{2}{3}¢$.
6. $\frac{4 \times 10 \times 60}{128} \times \$5 = \$93.75$.
7. $1\frac{10}{100} \times \$2000 = \$33,333\frac{1}{3}$.
8. (1) $\frac{2}{3} \times \$12 = \8 , the selling price of 5 bu. or 160 qts.
 (2) 1 qt. sells for $10¢$.
9. $1\frac{1}{2} \times 68 \text{ d.} = 12 \text{ d.}$ (we have 85% given and want 15% or $\frac{1}{5}$ of 68).
10. *Ans.* \$283.50.
11. $\frac{2}{3} \times 3.1416 \times (\frac{1}{4})^3 \times 500 \text{ lbs.} = 32.725 \text{ lbs.}$
12. End walls are $(20 + 1) \text{ yds.}$; others, 32 yds.; perimeter, 106 yds. Contents $\frac{1}{2} \times \frac{2}{3} \times 106 = 141\frac{1}{3}$, no. of cubic yds.
13. (1) 18 A. = 2880 sq. rds.
 (2) $2880 \div 240 = 12$, the width in rods of strip cut off.

Page 272; 388

1. *Ans.* $2\frac{7}{8}$.
2. (1) $\frac{7}{8}$ of $\frac{2}{3} = \frac{1}{4}$ of whole. (2) $\frac{5}{8}$ of $\frac{2}{3} = \frac{1}{3}$ of the whole.
 (3) $\frac{1}{3}$ is $\frac{2}{3}$ of $\frac{1}{4}$. (4) $\frac{2}{3} \times \$4060 = \$5413\frac{1}{3}$.
3. *Ans.* \$94.52.
4. $\frac{3.1416 \times (40)^2}{9} \times 75¢ = \418.88 .
5. (1) $50,000 \times \$112\frac{1}{2} = \$56,250$. (2) $\frac{4}{112\frac{1}{2}} = 3\frac{5}{7}\%$.
6. *Ans.* \$25.92. 7. $\frac{40 \times 48}{30} = 64$, the no. of men.

8. $80 \times \frac{1}{4} \times \$75 = \$8000.$
 9. *Ans.* \$76. 10. *Ans.* \$377.32.
 11. *Ans.* \$150. 12. *Ans.* \$421.55.

Page 273; 389

1. *Ans.* $\frac{87}{140}.$
 2. $\pi \times \left[\frac{1}{2} \text{ of } \frac{1000}{\pi} \right]^2 \times 2 = 159,155, \text{ no. of cu. ft.}$
 (Use cancellation.)
 3. $\sqrt{84^2 + 80^2} = 116.$
 4. (1) $\frac{2}{5}$ of \$200 = \$40, gained on one.
 (2) $\frac{3}{8}$ of \$200 = \$50, loss on the other. (3) Loss = \$10.
 5. *Ans.* \$15.80. 6. *Ans.* $\frac{1}{4} \frac{1}{4}.$
 7. $3.1416 \times 7 \times 7 \times 62\frac{1}{2} = \$96.21.$
 8. $\frac{2}{10} \times \frac{2}{10} \times \frac{1}{2}$ of \$750.35 = \$577.40.
 9. (1) $\frac{1}{3}$ of \$115.80 = \$386, the invoice price.
 (2) The duty, \$115.80 = 600 francs.
 10. *Ans.* \$12.75. 11. *Ans.* 0.02078125.
 12. (1) $\frac{2}{3}$ of $\frac{2}{3}$ of $\frac{2}{3} = \frac{8}{27}$, the part of whole left.
 $\frac{2}{3} \times 360 \text{ books} = 810 \text{ books.}$
 13. $20 \times (\$360 - \$75) = \$5700.$

Page 274; 390

1. *Ans.* $21\frac{1}{2}.$ 2. *Ans.* $21\frac{3}{4}.$
 4. (1) 6 strips each 6 yds. long = 36 yds.
 (2) 36 yds. @ $\$1\frac{1}{2} \div \$43.20.$
 5. $\frac{2}{3} \times \frac{2}{10} \times \frac{1}{2} \times \$120 = \$82.08.$

6. $2\frac{1}{2} \times \frac{3}{4} \times \frac{1}{10} \times 5 \times 365 \times \$2 = \$2007.50.$
 7. $\frac{3}{4} = 125.$
 8. (1) $\frac{100}{82} \times \$287 = \350 , the quarterly salary.
 (2) The yearly salary $= 3 \times \$350 + \$287 = \$1337.$
 9. *Ans.* $24\frac{1}{2}$ bu. 10. *Ans.* \$2.13. 11. *Ans.* \$150.

Page 275; 391

1. *Ans.* $2\frac{3}{4}.$ 2. $1\frac{1}{4} \times \$7050 = \$8625.$
 3. $96\frac{1}{2}\%$ of $576 \times \$7.17 = \$3978.72.$
 4. $\frac{5}{7\frac{1}{2}}$ or $1\frac{2}{3} = 66\frac{2}{3}\%.$
 5. (1) 2 for 3¢ is 18¢ per doz.
 (2) 10¢ gained on 8¢ invested is 125%.
 6. $\frac{63 \times 12 \times 45¢}{36} = \$9.45.$
 7. $\frac{8}{75} = 8\%.$ 8. *Ans.* \$21.84.
 9. (1) $8\frac{3}{4}$ to $5\frac{1}{2}$ is $\frac{5}{8}$ to $\frac{3}{8}$ or $\frac{3}{4}$. $\frac{3}{4} \times \$4.75 = \$7.48.$
 10. $\frac{5}{4} \times \frac{8}{5} \times \$1.20 = \$1.80.$ 11. $4\frac{9}{10} \times \$36.18 = \$4824.$
 12. *Ans.* 32.18; \$4.95 per 1000.

Page 276; 392

1. *Ans.* $12\frac{1}{4}.$ 2. *Ans.* $720.288+.$ 3. *Ans.* $87\frac{1}{4}$ sq. yds.
 4. $92\frac{1}{2}\%$ of $\$8000 = \$7400; \frac{4}{92\frac{1}{2}}$ or $1\frac{2}{35} = 4\frac{1}{3}\%.$
 5. *Ans.* \$39.65. 6. 4% of $\$5000 = \$200. \frac{4}{115\frac{1}{2}} = 3\frac{1}{33}\%.$

7. *Ans.* \$12. 8. *Ans.* \$24.79. 9. $\frac{4}{5} = 80\%$.
10. (1) 80¢ per cu. ft. = \$6.40 per cord or \$2.40 gained on each cord.
 (2) 30¢ per hundredweight = \$6 per ton or a gain of \$1.50 per ton. (3) $6 \times \$2.40 + 8 \times \$1.50 = \$26.40$ gain.
11. $35 \times 22 \times 3 \times 1\frac{1}{2} \times \frac{\$17.50}{1000} = \$53.90$.
12. (1) 16 strips 20 ft. long = $106\frac{2}{3}$ yds.
 (2) $106\frac{2}{3}$ yds. @ 45¢ = \$48.
13. $1\frac{1}{8} \times 1\frac{1}{8} \times \$489.60 = \$640$.

Page 277; 393

1. *Ans.* 4. 2. $\frac{1}{2}\frac{1}{10}$ of $\frac{\$19.20}{1.28} = 6\frac{1}{4}\%$.
3. $\sqrt{15^2 + 8^2} = 17$, no. of ft.
4. (1) Selling price \$1.20 per bu. or 45¢ gain.
 (2) Total gain = $20 \times 45\text{¢} = \$9$. (3) $\frac{4}{5} = \frac{2}{3} = 60\%$.
5. *Ans.* \$1115. 6. 32 qts. sell for \$4.80 or 15¢ per qt.
7. *Ans.* 71.55 rds. 8. *Ans.* 20%.
9. (1) $214,060 \div \$87\frac{7}{8} = 160$, the number of \$100 bonds bought. $160 \times \$3\frac{1}{2} = \560 , the income.
10. $64 \div (\frac{1}{3})^3 = 1728$. 11. *Ans.* $5\frac{1}{2}\%$. 12. 495.83.

Page 278; 394

1. $\left[\left(\frac{12 \times 68}{9} + \frac{18 \times 16}{9} \right) - \frac{75}{9} \right] \times 16\text{¢} = 114\frac{1}{3} \times 16\text{¢} = \18.29 .
2. $75 \times 14 \times \frac{7}{4} \times 1\frac{1}{2} \times \frac{\$1.50}{1000} = \$36.75$.

3. $4 \times \sqrt{3^2 + 4^2} = 20$.
 4. $7\frac{1}{2}\%$ of $\$33\frac{1}{4} = 5\%$.
 5. *Ans.* $\$789.78$. 6. *Ans.* 9 cords.
 7. $\frac{1}{5}$ of $\$207 = \23 . 8. *Ans.* $\$26.18$.
 9. $\frac{5}{8} \times \frac{1}{10} \times \$6 = \$4.50$. 10. *Ans.* $\$88.36$.
 11. *Ans.* $\$1562.50$. 12. $33 \times \frac{3}{4} \times \frac{1}{2} \times 35\% = \8.66 .

Page 279; 395

1. *Ans.* $6\frac{1}{2}$. 2. *Ans.* $\$1546.79$.
 3. *Ans.* $\$150$. 4. *Ans.* $0.853+$.
 5. $1\frac{2}{3} = \frac{4}{3}$; $\frac{4}{3}$ of $\$180 = \240 . 6. *Ans.* 1.002.
 7. $\$3076 \div \$96\frac{1}{2} = 32$, the no. of shares.
 8. *Ans.* $\$59.45$.
 9. (1) $\frac{1}{4}$ of $\$124 = \20.67 , gain on one.
 (2) $\frac{1}{4}$ of $\$124 = \31 , the loss on the other.
 (3) Net loss, $\$10.33$.
 10. *Ans.* $2\frac{2}{3}$.
 11. $\sqrt{8^2 + 10^2} = 12.806$.
 14. (1) 48 yds. cost $8 \times \$4.50$ or $\$36$.
 (2) 1 yd. cost 75% .
 15. (1) $\frac{3}{4} - \frac{2}{3} = \frac{1}{12}$, the part of a ton gained on $\frac{2}{3}$ or $\frac{2}{3}$ of a ton.
 (2) $\frac{1}{12} =$ rate of gain, $= 12\frac{1}{2}\%$.

ANSWERS

BOOK I, PART I (3-vol. ed.)

BOOK I, CHAP. I (2-vol. ed.)

Page 5		5. 87.	15. 43.	11. 205.
2. 37 marbles.		6. 77.	16. 42.	12. 245.
3. 37 cows.		7. 80.	17. 20.	13. 244.
4. 37 ¢.		8. 89.	18. 200.	14. 1493.
5. 57 ¢.		9. 78.	19. 120.	15. 1880.
6. 67.		10. 89.	20. 77.	16. 1395.
7. 58.		11. 99.	21. 38.	17. 1229.
8. 79.		12. 97.	22. 79.	18. 1276.
9. 59.		13. 86 ¢.	23. 109.	19. 2984.
10. 95.		14. 35 chickens.	24. 154.	20. 2867.
11. 96.		15. 67 ¢.	25. 100.	21. 2041.
12. 69.		16. 39 pieces.	26. 600.	22. 2003.
13. 98.		17. 87 ¢.	27. 133.	23. 2074.
14. 88.		18. 98 ¢.	28. 207.	
15. 88.		19. 99 quarts.	1. 25.	Page 16
16. 79 sheep.			2. 87.	1. 1613.
17. 48 ¢.		Page 12	3. 23.	2. 1722.
18. 45 ¢.		1. 30.	4. 95.	3. 1941.
		2. 27.	5. 1.	4. 2621.
Page 6		3. 28.	6. 44.	5. 3039.
1. 20.		4. 36.		6. 2689.
2. 14.		5. 34.	Page 15	7. 3029.
3. 17.		6. 42.	2. 84.	8. 2591.
4. 24.		7. 30.	3. 121.	9. 1871.
5. 21.		8. 23.	4. 183.	10. 2136.
6. 24.		9. 29.	5. 184.	11. 1880.
		10. 43.	6. 165.	12. 1307.
Page 7		11. 19.	7. 170.	1. \$ 662.
1. 68.		12. 83.	8. 164.	2. 445 A.
2. 97.		13. 85.	9. 203.	3. 2935 bu.
3. 79.		14. 91.	10. 184.	4. \$ 2147.
4. 89.				

Page 18

4. 274.
5. \$600.
6. 233.

Page 19

1. 114.
2. 206.
3. 203.
4. 208.
5. 206.
6. 258.
7. 208.
8. 117.
9. 506.
10. 208.
11. 105.
12. 708.
13. \$413.
14. \$441.
15. 128 yr.
16. 125 miles.
17. 217 bu.
18. 416 oranges.
19. \$265.
20. 63 bu.
21. 23 pupils.

Page 21

4. 84.
5. 126.
6. 168.
7. 142.
8. 22.
9. 24.
10. 26.
11. 108.
12. 166.
13. 148.
14. 128.
15. 62.

16. 66.
17. 88.
18. 166.
19. 104.

Page 25

10. 69.
11. 69.
12. 99.
13. 99.
14. 126.
15. 126.
16. 186.
17. 153.
18. 51.
19. 186.
20. 62.
21. 166.
22. 83.

Page 28

11. 168.
12. 364.
13. 320.
14. 288.
15. 244.
16. 200.
17. 2484.
18. 2808.
19. 1244.
20. 2048.
21. 1608.
22. 2848.

23. 21.
24. 42.
25. 30.
26. 62.
27. 81.
28. 90.

Page 31

3. 201.
5. 91.

6. 184.
7. 391.
8. 451.
9. 181.
10. 182.
11. 192.
12. 513.
13. 198.
14. 306.
15. 111.
16. 467.
17. 192.
18. 2896.
19. 5594.
20. 934.
21. 6148.
22. 624.
23. 7480.
24. 5366.
25. \$1.18.
26. \$.96.
27. \$1.16.
28. \$4.13.
29. \$3.36.
30. \$.36.
31. \$1.02.
32. 576.
33. 535.

Page 32

1. \$2.43.
2. \$21.82.
3. 1370.
4. 2643.
5. \$9.08.
6. \$5.78.
7. 98 A.
8. \$129.
9. 134 pigs; 402a.
10. 5868 letters.

11. \$53.78 Paul;
\$107.56 all.
12. 275.
13. 2728.
14. 1921.
15. 2824.
16. 2386.
17. 2863.

Page 33

1. \$110.
2. 1997.
3. \$3971.
4. \$693.
5. \$219.
6. \$2820.
7. 15,339 lb.
8. \$2728.

Page 36

1. 17,589.
2. 20,281.
3. 22,339.
4. 28,798.
5. 12,917.
6. 18,934.
7. 21,202.
8. 26,820.
9. 29,582.
10. 16,541.
11. 21,672.
12. 24,980.
13. 14,584.
14. 14,827.
15. 18,710.
16. 24,420.
17. 32,727.
18. 29,886.
19. 17,854.
20. 25,471.

21. 32,008.
22. 27,863.
23. 20,180.
24. 32,246.
25. 22,989.
26. 31,092.
27. 16,626.
28. 18,610.
29. 23,676.
30. 22,076.
31. 27,922.
32. 38,059.
33. 40,162.
34. 39,434.
35. 26,348.
36. 38,234.
37. 32,398.
38. 32,528.
39. 36,294.
40. 41,644.
41. 25,264.
42. 22,170.
43. 24,493.
44. 21,009.
45. 23,933.
46. 22,876.
47. 21,116.
48. 26,851.
49. 25,592.
50. 20,660.
51. 25,087.
52. 30,053.
53. 28,519.
54. 17,609.
55. 26,374.
56. 29,989.
57. 31,585.
58. 31,316.
59. 30,255.
60. 33,916.
61. 33,765.

62. 34,741.
63. 26,067.
64. 32,343.
65. 27,280.
66. 30,389.
67. 31,138.
68. 27,694.
69. 28,209.
70. 27,588.
71. 46,687.
72. 45,700.
73. 49,595.
74. 37,751.
75. 38,721.
76. 43,872.
77. 49,889.
78. 40,857.
79. 42,464.
80. 39,128.

Page 43

11. 434.
12. 975.
13. 936.
14. 3155.
15. 1164.

Page 44

1. \$172.
2. \$132.
3. 408 sheep.
4. 875 bu.
5. 136 pages.
6. 1911.
7. 1442.
8. 1276.
9. 2592.
10. 4865.
11. 2841.
12. 1356.
13. 3538.

14. 3810.
15. 2552.

Page 45

3. \$80.
4. \$84 ph. ;
\$112 both.
5. \$185.
6. 190 bu.
7. 336 bu.
8. \$1168.
9. \$370.
10. \$648.
11. \$4265.
12. 3370 bu.

Page 50

1. \$6.61.
2. 247 sheep.
3. 296 boys.
4. 58.
5. 390 cattle.
6. 442 gal.
7. 95.
8. 8 bu.
9. \$204.
10. 440 bu.
11. 80¢.

Page 53

1. 138.
2. 252.
3. 324.
4. 204.
5. 432.
6. 126.
7. 72.
8. 234.
9. 270.
10. 522.
11. \$7.80.

12. 218 papers.
13. \$1.09 per wk.
14. 120 recitations.
15. \$3.84.
16. \$1.86.
17. 189 perch.
18. 252 papers.
19. 240 A.

Page 56

1. 126.
2. 192.
3. 270.
4. 378.
5. 450.
6. 588.
7. 450.
8. 560.
9. 720.
10. 750.
11. 1200.
12. 210.
13. 156.
14. 128.
15. 38.
16. 79.
17. 21.
18. 21.
19. 22.
20. 19.
21. 71.
22. \$18.58.
23. \$3.50.
24. \$7.50.
25. \$45.

Page 57

1. 1416 bu.
2. \$3.25.
3. 1056 qt.
4. 692 qt. bottles.

5. 432 papers.
6. 1608.
7. 3965.
8. 5190.
9. 3724.
10. 4135.
11. 1472.
12. 5568.
13. 3965.
14. 5046.
15. 835.
16. 1072.
17. 4495.
18. 4788.
19. 2572.
20. 42.
21. 31.
22. 31.
23. 323.
24. 52.
25. 63.
26. 71.
27. 61.
28. 41.
29. 62.
30. 81.
31. 81.
32. 90.
33. 71.
34. 314; rem. 2.
35. 300.
36. 180.
37. 968.
38. 1050.
39. 396.

Page 60

5. 21.
6. 21.
7. 31.
8. 91.

9. 61.
10. 91.
12. 16.
13. 15.
14. 14.
15. 13.
16. 16.
17. 15.
18. 14.
19. 13.
20. 18.
21. 19.
22. 16.
23. 14.
24. 58.
25. 46.
26. 44.
27. 42.
28. 58.
29. 46.
30. 44.
31. 42.
32. 22.

Page 61

1. \$4350.
2. 228 sheep.
3. 224 lb.;
336 lb.;
392 lb.
4. 131 A.
5. 32 bu.
6. \$125.
7. 1956 lbs.
8. 112 bu.
9. 246 bu.
10. \$1944.
11. 1008 sq. in.
12. 2772.
13. 2082.
14. 6888.

15. 1985.
16. 1953.
17. 54.
18. 24.
19. 43.
20. 35.
21. 56; rem. 3.

Page 63

1. sum 24;
diff. 12;
prod. 108;
quot. 3.
2. \$17.96.
3. \$1.07.
4. 105 qt.
5. 21 pencils.
6. 476.
7. 987.
8. 1197.
9. 82.
10. 172.
11. 38.
12. 37.

Page 69

1. 105.
2. 473.
3. 40.
4. 234.
5. 64.
6. 73.
7. 97.
8. 85.
9. 16.
10. 109.
11. 97.
12. 2520.
13. 24.
14. 18.
15. 36.
16. 49.

Page 71

1. \$3.20.
2. \$1.92 per bu.;
\$15.36.
3. \$1.60 per bu.;
5¢ per qt.
4. 10 pks.
5. \$5.76.
6. \$12.60.
7. \$5.12.
8. 8 feeds;
64 feeds.
9. \$36.
10. 10 bu.
11. 11 bu. and 1
pk.
12. 12 pk. and 4
qt.

Page 74

5. 1750.
6. 2320.
7. 172.
8. 352.
9. 632.
10. 496.
11. 592.
12. 31.
13. 91.
14. 41.
15. 2616.
16. 177.
17. 24.
18. 222.
19. \$.75.
20. \$1096.
21. 97 apples.

Page 75

2. 344.
3. 441.

4. 324.
5. 324.
6. 615.
7. 525.
8. 588.
9. 400.
10. 528.
11. 700.
12. 228.
13. 189.

Page 76

1. 22,827.
2. 6656.
3. 5808.
4. 72,555.
5. 21,795.
6. 1735.
7. 5586.
8. 5852.
9. 3956.
10. 5880.
11. 6734.
12. 3504.
13. 3215.
14. 2367.
15. 2868.
16. 7128.
17. 4698.
18. 188.
19. 115.
20. 241.
21. 130.
22. 150.
23. 52.
24. 159.
25. 59.
27. 153.
28. 308.
29. 260.
30. 144.

31. 405.
32. 174.
33. 600.
34. 280.
35. 588.
36. 492.
37. 474.
38. 360.

Page 77

5. 221 bu.
6. 720 A.
7. 324 qt.
8. 645 mi.
9. 282 ft.
10. \$1.33.
11. \$5.85.
12. 414.
13. 481.
14. 300.
15. 414.
16. 495.
17. 806.
18. 483.
19. 462.
20. 792.
21. 735.
22. 333.
23. 376.
24. 531.
25. 528.
26. 234.

Page 80

2. 420 cu. in.
3. 384 cu. ft.
4. 126 cubes.
5. 4 cu. in.
6. 2 in. high.
7. 27 cu. in.
8. 336 cu. ft.

Page 81

1. 189.
2. 222.
3. 243.
4. 450.
5. 488.
6. 491.
7. 423.
8. 138.
9. 295.
10. 206.
11. 43.
12. 176.

Page 85

1. 432 sheep.
2. 63¢.
3. \$3152.
4. \$35.
5. \$55.
6. \$1134.
7. \$9.49.
8. 71 sheep.
9. \$22.32.
10. 3214.
11. 118 bu.
12. 144 A.
13. 320 A.
14. 442.

Page 86

1. \$17.16.
2. \$4.74.
3. 783.
4. 96.
5. \$21.54.
6. \$34.20.
7. \$18.02.
8. \$9.17.
9. \$39.45.
10. \$.52.
11. \$2.63.

12. \$3.67.
13. \$2.89.
14. \$1.04.
15. \$1645.
16. \$3736.
17. \$7731.
18. \$4275.
19. \$6656.
20. 38.
21. 54.
22. 66.
23. 77.
24. 97.
25. \$1943.
26. \$3700.
27. \$5652.
28. \$8192.
29. \$7298.

Page 88

1. \$114.80 ;
\$172.20.
2. \$0.63 ; 42 ; 21.
3. \$3 ; \$4.50.
4. \$1.60 ; \$6.40 ;
\$9.60.
5. 3 hr. ; 9 hr.

Page 91

15. 30,066.
16. 15,297.
17. 23,703.
18. 32,508.
19. 27,829.

Page 95

2. \$9.92.
3. \$19.53.
4. \$20.76.
5. \$11.95.
6. \$10.43.
7. \$13.88.

8. \$17.76.
9. \$18.35.
10. \$19.71.
11. \$47.30.
13. \$2.16.
14. \$2.69.
15. \$12.38.
16. \$1.89.
17. 99 bu. & 1 pk.
18. 99 gal. & 4 pt.
19. 392 pk.
20. 1968 pt.

Page 96

1. \$105.
2. \$.23 per doz. ;
\$1.61.
3. \$28.60.
4. \$12.50.
5. \$5.75 per wk. ;
\$11.50 ; \$40.25.
6. \$49.
7. \$144 ; \$3.60.
8. 288 qt.
9. 98 bu.
10. 244 gal.
11. 123 pk.
12. 13 tons.
13. 100 bu.

14. 48 suits.
15. 32½ wk.

Page 99

22. 988.
23. 1462.
24. 782.
25. 2115.
26. 3886.
27. 4914.
28. 622½.
29. 7626.
30. 4371.
31. 6013.
32. 3712.
33. 3060.
34. 7448.
35. 2975.
36. 8241.
37. 12,282.
38. 23,275.
39. 36,801.
40. 18,752.
41. 33,201.

Page 100

1. \$900.
2. \$768.
3. \$2184.

4. 1344 bu.
5. \$243 cost ;
\$144 gain.
6. \$6370.
7. 2548 bu.
8. 896 sq. ft.
9. 3120 sq. ft.
10. 6912 sq. ft.
11. \$5985.
12. 784 white
sheep.

Page 101

6. ½ hr.
7. 90 min.
8. 30 min. ;
15 min. ;
20 min.
9. ½ da. ; ½.
10. 4 mo. ; 8 mo.
11. ½ yr. ; 3.

Page 104

1. \$111.53.
2. 540.
3. \$103.50.
4. \$11.04.
5. 365 da.
6. 366 da.

7. 3287 da.
8. \$17.54.
9. 750 min.

Page 105

1. 1651.
2. 3567 gal.
3. 1666.
4. 288 in.
5. 1 da.
6. 54¢.
7. \$1.68.
8. 847.
9. \$12.06.
10. \$3.60.
11. \$13.27.
12. 408.
13. \$1.75.

Page 106

1. \$3.73.
2. 2360 bu.
3. \$3788.
4. 70.
5. \$330.
6. \$5.27.
7. 32.
8. 42.
9. \$9.12.

ANSWERS

BOOK I, PART II (3-vol. ed.)

BOOK I, CHAP. II (2-vol. ed.)

Page 114

1. 2206 qt.
2. \$ 4.94.
3. 3271 qt.
4. 968 bu.
5. \$ 5753.
6. 727.
7. 1058.
8. \$ 5105.

Page 116

1. \$ 139.83.
2. \$ 553.57.
3. \$ 282.15.
4. \$ 1329.98.
5. \$ 308.60.
6. \$ 207.85.
7. \$ 1343.79.
8. \$ 748.36.
9. \$ 291.46.
10. \$ 301.68.
11. \$ 136.69.
12. 123 ft.
13. 22,644.
14. \$ 11.75.
15. 120 ft.
16. 36,619.
17. 31,725.
18. 34,215.
19. 31,945.
20. 34,268.

Page 118

2. 185.
3. 363.
4. 4351.
5. 9863.
6. 6357.
7. \$ 57.32.
8. \$ 30.51.
9. 504.
10. 2421.
11. 192,425.
12. \$ 84.19.

Page 119

1. \$ 1803.13.
2. \$ 1505.47.
3. \$ 2053.95.
4. \$ 1783.73.
5. \$ 1440.24.
6. \$ 2078.36.
7. \$ 921.91.
8. \$ 2359.88.
9. \$ 1213.87.
10. \$ 2642.49.
11. \$ 212.51.
12. \$ 286.79.
13. \$ 2711.58.
14. \$ 2762.12.
15. \$ 2613.52.
16. \$ 311.79.
17. \$ 277.34.
18. \$ 2420.17.

19. \$ 2875.78.

20. \$ 3331.43.
21. \$ 246.14.
22. \$ 331.53.
23. \$ 3270.14.
24. \$ 3431.77.
25. \$ 3385.30.
26. \$ 414.11.
27. \$ 401.88.
28. \$ 3796.98.
29. \$ 3574.82.
30. \$ 4255.69.
31. \$ 376.12.
32. \$ 483.73.
33. \$ 4114.39.
34. \$ 4398.34.
35. \$ 4574.09.
36. \$ 524.30.
37. \$ 564.13.
38. \$ 5131.75.
39. \$ 5637.90.
40. \$ 5944.95.
41. \$ 39.03.
42. \$ 11.11.
43. \$ 1.92.
44. \$ 11.11.
45. \$ 11.11.
46. \$ 11.11.
47. \$ 11.11.
48. \$ 11.11.
49. \$ 78.89.
50. \$ 11.11.

51. \$ 66.04.

52. \$ 350.15.
53. \$ 756.33.
54. \$ 428.42.
55. \$ 823.85.
56. \$ 513.82.
57. \$ 96.53.
58. \$ 595.52.
59. \$ 268.40.
60. \$ 668.56.
61. \$ 508.09.
62. \$ 111.11.
63. \$ 109.11.
64. \$ 111.11.
65. \$ 788.88.
66. \$ 111.09.
67. \$ 20.21.
68. \$ 102.11.
69. \$ 111.11.
70. \$ 111.09.
71. \$ 308.96.
72. \$ 111.11.
73. \$ 790.89.
74. \$ 111.11.
75. \$ 111.11.
76. \$ 102.13.
77. \$ 111.11.
78. \$ 111.11.
79. \$ 20.21.
80. \$ 111.09.
81. \$ 105.07.
82. \$ 361.26.

83. \$756.25.
 84. \$479.53.
 85. \$834.96.
 86. \$524.93.
 87. \$107.64.
 88. \$606.63.
 89. \$189.51.
 90. \$679.67.
 91. \$574.13.
 92. \$461.26.
 93. \$865.44.
 94. \$539.53.
 95. \$34.97.
 96. \$624.91.
 97. \$116.74.
 98. \$697.63.
 99. \$379.51.
 100. \$779.65.
 101. \$817.05.
 102. \$222.22.
 103. \$681.78.
 104. \$222.22.
 105. \$677.77.
 106. \$213.22.
 107. \$181.32.
 108. \$213.22.
 109. \$131.32.
 110. \$222.18.
 111. \$618.16.
 112. \$472.37.
 113. \$867.36.
 114. \$550.64.
 115. \$46.08.
 116. \$636.02.
 117. \$127.85.
 118. \$708.74.
 119. \$300.62.
 120. \$790.76.
 121. \$883.09.
 122. \$572.37.
 123. \$74.55.

124. \$650.64.
 125. \$146.08.
 126. \$727.04.
 127. \$227.85.
 128. \$808.74.
 129. \$399.72.
 130. \$890.74.

Page 122

7. 2975 da.
 8. 2355 ft.
 9. 2596 qt.
 10. 10248 hra.
 11. \$1932.
 12. \$985.
 13. \$4361.
 14. \$7785.

Page 124

1. \$1.96.
 5. 47¢.
 6. \$1.02

Page 125

1. \$12.28.
 2. \$9.04.
 3. \$7.19.
 4. \$13.20.
 5. \$22.26.
 6. \$16.24.
 7. \$10.18.
 8. \$18.75.
 9. \$39.
 10. 22 qt.
 11. \$3.27.
 12. \$6.58.

Page 130

1. \$9.25.
 2. \$7.03.
 3. \$28.32.
 4. \$51.83.

5. \$62.08.
 6. \$47.25.
 7. \$48.95.
 8. \$1.65.
 9. \$1.49.
 10. \$1.45.
 11. \$1.35.
 12. \$1656.36.
 13. \$369.75.
 14. \$581.67.
 15. \$1214.01.
 16. \$5490.54.
 17. \$4894.56.
 18. \$2239.05.
 19. \$3979.86.
 20. \$6410.25.

Page 131

1. \$16.44.
 2. \$6.
 3. \$7.50.
 4. \$17.76.
 5. 5 lb.
 6. \$20.
 7. \$5500.
 8. \$1.
 9. 329,832.
 10. 665,280.
 11. 126,071.
 12. 587,736.
 13. 317,564.
 14. 430,443.
 15. 634,179.
 16. 598,272.
 17. 594,110.
 18. 3,743,520 ft.

Page 132

1. \$33.
 2. \$408.
 3. \$2.53.

4. \$2000.
 5. \$327.33.
 6. 345 sq. in.
 7. \$1293.75.
 8. \$1836.
 9. \$127.50.
 10. \$1500.
 11. \$7.35.

Page 133

1. \$5555.
 2. \$3690.
 3. \$17.
 4. 70¢; \$13.72.
 5. \$130.
 6. \$1.75.
 7. \$480.
 8. \$43.84.
 9. \$58.80.
 10. \$48.60.
 11. \$4.80.

Page 137

1. 120 in.
 2. 48 ft.
 3. 50 in.
 4. 8½ ft.
 5. 9 yd.
 6. 81 ft.
 7. 32 ft.
 8. 6½ yd.
 9. 18½ lb.
 10. 4800 oz.
 11. 168 oz.
 12. 4½ lb.
 13. 8 oz.
 14. 32 oz.
 15. 48.
 16. \$3.
 17. \$2.80.
 18. \$5.12.

19. \$288.
20. \$4.
21. \$33.60.
22. \$32.

Page 138

2. 5, rem. 11.
3. 4, rem. 5.
4. 5, rem. 22.
5. 9, rem. 13.
6. 4, rem. 14.
7. 7, rem. 5.
8. 4, rem. 42.
9. 3, rem. 28.
10. 2, rem. 26.
11. 3, rem. 38.
12. 4, rem. 10.
13. 3, rem. 14.

15. (a)

- (1) 40, rem. 9.
(2) 27, rem. 12.
(3) 20, rem. 29.
(4) 16, rem. 33.
(5) 13, rem. 56.
(6) 11, rem. 68.
(7) 10, rem. 39.
(8) 9, rem. 30.

(b)

- (1) 45, rem. 4.
(2) 30, rem. 19.
(3) 23, rem. 6.
(4) 18, rem. 31.
(5) 15, rem. 34.
(6) 13, rem. 26.
(7) 11, rem. 58.
(8) 10, rem. 39.

(c)

- (1) 75, rem. 17.
(2) 51, rem. 11.

- (3) 38, rem. 34.
(4) 31, rem. 11.
(5) 26, rem. 6.
(6) 22, rem. 30.
(7) 19, rem. 53.
(8) 17, rem. 45.

(d)

- (1) 330, rem. 15.
(2) 210, rem. 15.
(3) 169, rem. 16.
(4) 135, rem. 40.
(5) 113, rem. 52.
(6) 97, rem. 58.
(7) 85, rem. 60.
(8) 76, rem. 29.

(e)

- (1) 451, rem. 7.
(2) 305, rem. 23.
(3) 231, rem. 7.
(4) 185, rem. 43.
(5) 155, rem. 23.
(6) 133, rem. 35.
(7) 117, rem. 1.
(8) 104, rem. 14.

16. (a)

- (1) 46, rem. 9.
(2) 31, rem. 14.
(3) 23, rem. 32.
(4) 19, rem. 6.
(5) 15, rem. 60.
(6) 13, rem. 52.
(7) 12, rem. 3.
(8) 10, rem. 65.

(b)

- (1) 30, rem. 13.
(2) 20, rem. 23.
(3) 15, rem. 28.
(4) 12, rem. 31.

- (5) 10, rem. 33.
(6) 9, rem. 4.
(7) 7, rem. 76.
(8) 7, rem. 6.

(c)

- (1) 116
(2) 78, rem. 18.
(3) 59, rem. 17.
(4) 47, rem. 39.
(5) 39, rem. 57.
(6) 34, rem. 22.
(7) 30, rem. 6.
(8) 37, rem. 69.

(d)

- (1) 351, rem. 20.
(2) 238, rem. 13.
(3) 180, rem. 11.
(4) 144, rem. 47.
(5) 121, rem. 10.
(6) 104, rem. 7.
(7) 91, rem. 20.
(8) 81, rem. 20.

(e)

- (1) 309, rem. 3.
(2) 209, rem. 13.
(3) 158, rem. 14.
(4) 127, rem. 15.
(5) 106, rem. 26.
(6) 91, rem. 31.
(7) 80, rem. 12.
(8) 71, rem. 31.

Page 139

1. 767.
2. 6072.
3. 5729.
4. 2916.
5. 2520.
6. 463.

7. 1578.
8. 31,575.
9. 6081.
10. \$41.90.
11. 144, rem. 40.
12. 133, rem. 56.
13. 140, rem. 14.
14. 159, rem. 49.
15. 88, rem. 30.
16. 126, rem. 13.
17. 131, rem. 46.
18. 166, rem. 3.
19. 146, rem. 8.
20. 158, rem. 49.
21. 95,056.
22. 234,260.
23. 287,111.
24. 100,902.
25. 266,112.
26. 391 $\frac{1}{3}$.
27. 24.
28. 118.
29. 290.
30. 3348.
31. \$58.88.
32. \$3.12 $\frac{1}{2}$.
33. 13 doz.

Page 144

7. 96 sq. ft.
8. 64 sq. ft.
9. 63 sq. ft.
10. 135 sq. ft.
11. 28 sq. yd.
12. 135 sq. ft.;
15 sq. yd.

Page 145

1. 1728 sq. in.
2. 672 sq. ft.
3. 104 ft.

4. 33 ft.;
4356 sq. ft.
5. 960 yd.
6. 8 ft.
7. 216 sq. ft.
8. \$32.25.
9. 368 yd.
10. \$55.20.
11. 82.
12. $4\frac{1}{2}$ yd.
13. \$26.

Page 146

2. 925.
3. 7163.
4. 5481.
5. 5460.
6. 4081.
7. \$11,175.
8. 17,423 ft.
9. 12,100 yd.
10. 33,867.

Page 147

1. \$240.
2. \$1.80.
3. \$8773.
4. \$3.22.
5. \$4.18.
6. \$224.
7. \$2.
8. 240 lb.
9. 1305.
10. 79¢.
11. \$30.30.

Page 149

1. 49 lb.; 294 lb.
2. \$10.50; \$21.
3. \$12,800.
4. 60 bu.
5. \$8.40.

6. 95¢; \$2.85;
\$8.55.
7. 270 A.
8. 290 rd.
9. \$8.25.
10. \$123.75
11. 301.
12. \$240.

Page 151

1. \$675.
2. 288 sq. in.
3. 24 oz.; 36 oz.;
82 oz.
4. 36¢.
5. 162.
6. \$1201.65.
7. 35.
9. \$715.
10. \$1910.70.
11. 1000 sq. yd.
12. \$840.
13. \$3167.14.
14. 3,353,556.

Page 152

1. \$10,143.
2. \$2335.20.
3. \$475.20.
4. \$28.50.
5. \$6480.
6. \$53.76.
7. \$24.75.
8. \$9.30.
9. \$55.
10. \$357.
11. \$49.

Page 153

4. 2 ways.
6. 1440 sq. ft.
7. 168 ft.

Page 154

2. \$88.
3. 1815 sq. yd.
4. \$44.50.
5. 5320 sq. ft.
7. 500 sq. ft.
8. 108 sq. yd.;
\$29.16.
9. 54 sq. yd.
10. 324 sq. ft.

Page 155

2. 55, rem. 59.
3. 114, rem. 6.
4. 72, rem. 60.
5. 977, rem. 11.
6. 796, rem. 14.
7. 578, rem. 6.
8. 935, rem. 15.
9. 97, rem. 52.
10. 41, rem. 79.
11. 78, rem. 2.
12. 4153, rem. 42.
13. 3748, rem. 37.
14. 3640, rem. 61.
15. 2146, rem. 83.
16. 6548, rem. 80.
17. 5462, rem. 43.
18. 1146, rem. 11.
19. 10,070, rem. 41.
20. 179, rem. 71.
21. 1137, rem. 37.
22. 2201, rem. 3.
24. 2444, rem. 10.
25. 2981, rem. 17.
26. 621, rem. 27.
27. 1768, rem. 12.
28. 1088, rem. 54.
29. 746, rem. 61.
30. 447, rem. 40.

31. 374, rem. 67.
32. 317, rem. 50.
33. 859, rem. 31.
34. 985, rem. 18.
35. 1004, rem. 20.

Page 156

1. \$90.60.
2. \$2160.
3. \$1.26.
4. 864 mi.
5. \$17.10.
6. \$2.14.
7. \$9750.
8. \$1.32.
9. \$6.40.
10. \$10.50.
11. \$7.50.
12. 49 lb.
13. \$1.75.

Page 158

3. 3456 cu. in.
4. 864 cu. in.;
432 cu. in.
5. 216 cu. in.
6. 168 cu. ft.

Page 159

2. 31,104 cu. in.
3. 98,496 cu. in.
4. 46,656 cu. in.
5. 2619 cu. ft.
6. 89, rem. 22.
7. 84 cu. yd.
8. 1920 cu. yd.
9. $\frac{1}{2}$ as large.
10. 456 lb.
11. $\frac{1}{2}$ as large;
 $7\frac{1}{2}$ lb.

Page 160

1. \$238.42.
2. \$96.57.
3. \$299.13.
4. \$152.59.
5. \$1057.86.
6. \$710.91.
7. \$2166.92.
8. \$385.36, and \$1 remaining.
9. 7282 lb., and 8 lb. remaining.
10. 5406.
11. 8333, and 4 remaining.
12. 155.
13. 10,226, rem. 28.
14. 3789, rem. 38.
15. 2057, rem. 13.
16. 5179, rem. 76.
17. 5777, rem. 83.
18. 4234, rem. 71.
19. 7679.
20. 9640, rem. 36.
21. 10,232, rem. 26.
22. 10,366, rem. 15.
23. 18,051, rem. 26.
24. 11,609, rem. 20.
25. 7026, rem. 5.
26. 4455, rem. 54.
27. 9974, rem. 58.
28. 3904, rem. 88.
29. 3196, rem. 15.
30. 2096, rem. 58.
31. 7589, rem. 5.
32. 5255, rem. 45.
33. 12,077, rem. 11.
34. 4687, rem. 10.
35. 11,313, rem. 8.

36. 6274, rem. 63.
37. 1384, rem. 53.
38. 7432, rem. 83.
39. 1263, rem. 5.
40. 6198, rem. 25.
41. 4558, rem. 9.
42. 5863, rem. 69.

Page 161

1. 9044.
2. \$390.26.
3. \$2736.
4. \$562.50.
5. 116.
6. \$162.50.
7. 54¢; \$9.72.
8. \$15.
9. 36 bu.; 324 bu.
10. \$1001.

Page 162

1. \$200.75.
2. \$82.80.
3. \$94.50.
4. \$972.
5. \$114.75.
6. \$85.
7. \$108.
8. \$79.50.
9. \$36.13.
10. \$23.38.
11. \$16.49.
12. \$67.50.
13. \$78.
14. \$216.60.
15. \$27.93.
16. \$16.65.

Page 163

1. 2856 sq. in.
3. 60 cu. in.

4. 96 sq. in.
5. 288 sq. ft.
6. 4096 sq. ft.
7. 8 ft.
8. 320 ft.
9. \$17.07.
10. \$21.76.
11. 2142 cu. in.
12. 468 cu. ft.
13. 585 bu.

Page 164

32. 40¢; \$1.60.
33. \$4.80; \$8.40.
34. \$61.50; \$92.25.
35. \$2.52; \$5.04.
36. \$78.75; \$189.
37. \$220.50; \$514.50.

Page 165

1. \$1.40.
2. \$5.40.
3. \$4.80.
4. \$2.08.
5. 72¢.
6. 32.
7. 81.
9. 43 lb.
10. 1392.
11. 55 da.
12. \$23.

Page 169

8. \$534.
9. \$1.05.
10. \$1.40.
11. \$93.
12. \$105.

13. 116 sq. ft.
14. \$1360.

Page 172

2. 12.08.
3. 19.62.
4. 21.25.
5. 6.58.
6. 6.32.

Page 173

1. 2.18.
2. 2.83.
3. 4.89.
4. 6.14.
5. 6.23.
7. 4.34.
8. 6.57.
9. 2.37.
10. 7.35.
11. 14.63.
12. 22.36.
15. 34.74; 38.36; 55.44; 133.2; 118.3; 293.4.

Page 174

3. 0.18.
4. 0.16.
5. 0.12.
6. 1.21.
7. 1.83.
8. 2.24.
9. 3.81.
10. 0.13.
11. 0.81.
12. 2.97.
13. 0.61.
14. 1.08.

15. 22.8.
16. 7.52.
17. 22.76.
18. 452.4.
19. 35.28.
20. 0.81.
21. 0.31.
22. 5.69, rem. .11.
23. 0.24.
24. 1.55.
25. 366.32.
26. 343.14.
27. 6.56.
28. 4.34.
29. 6.22.

Page 175

1. 351, rem. 36.
2. 1054, rem. 8.
3. 793, rem. 41.
4. 1138, rem. 9.
5. 923, rem. 24.
6. 1843, rem. 23.
7. 958, rem. 60.
8. 1356, rem. 1.
9. 1264, rem. 42.
10. 1055, rem. 5.
11. 8201, rem. 68.
12. 2267, rem. 47.
13. 715, rem. 28.
14. 10,070.
15. 6410, rem. 30.
16. 3021, rem. 10.
17. 5768, rem. 20.
18. 382, rem. 70.
19. 2508, rem. 68.
20. 5903, rem. 27.
21. 3453, rem. 50.
22. 3968, rem. 3.
23. 1102, rem. 46.

24. 2178, rem. 53.
25. 4502, rem. 40.
26. 19,752, rem. 17.

27. 1020.
28. 995, rem. 56.
29. 1385, rem. 46.
30. 3509, rem. 27.
31. 293, rem. 44.
32. 1899, rem. 64.
33. 5137, rem. 16.
34. 7644, rem. 10.
35. 4592, rem. 5.
36. 9962, rem. 21.
37. 9978, rem. 42.
38. 9976, rem. 23.
39. 9895, rem. 23.
40. 9805, rem. 57.
41. 1611, rem. 58.
42. 2399, rem. 1.
43. 1472, rem. 229.
44. 1199, rem. 113.
45. 2029, rem. 17.
46. 1218, rem. 514.
47. 596, rem. 263.
48. 770, rem. 558.
49. 1011, rem. 585.
50. 1290, rem. 755.

Page 177

3. 9, and \$ 2 rem.
4. 87 except 1, and it 86.
5. 28 ; 3 pk. rem.
6. 8 ; 16 bu. rem.
7. \$4.07 ; 1¢ rem.
8. 42.
9. 14.
10. \$5.38.
11. 74 ; 59 rem.

12. 277 ; 28 in. rem.
13. \$3.75.

Page 178

1. 19,020.
2. 41,321.
3. 6723.
4. 21,834.
5. 107,412.
6. 30,832.
7. 34,312.
8. 20,814.
9. 8343.
10. 24,240.
11. 32,800.
12. 10,495.
13. 28,992.
14. 42,364.
15. 22,860.
16. 958.
17. 1489 ; \$33 rem.
18. 1216 ; 14 ft. rem.
19. 353 ; 34 yd. rem.
20. 819 yd. ; 9 yd. rem.
21. 152 ; 8 rem.
22. 159 A. ; 23 A. rem.
23. \$35.27.
24. \$125.33.
25. \$49.05 ; 20¢ rem.
26. 330 ft. 2 in.
27. 46,544 in.
28. 1320 yd. 2 ft.
29. 11,886 ft.
30. 179.86.
31. 195.56.
32. 950.4
33. 5.27.

Page 179 $a \times g$

1. 10,964.
2. 34,735.
3. 68,409.
4. 58,653.
5. 108,306.
6. 27,648.
7. 64,368.
8. 56,202.
9. 94,752.
10. 17,529.

 $a \times h$

1. 29,156.
2. 128,285.
3. 627,885.
4. 293,860.
5. 810,623.
6. 159,264.
7. 741,792.
8. 339,234.
9. 1,054,020.
10. 235,362.

 $a \times i$

1. 528,064.
2. 2,945,875.
3. 3,315,951.
4. 6,291,348.
5. 4,849,152.
6. 3,175,044.
7. 7,115,808.
8. 4,174,494.
9. 9,438,360.
10. 2,789,289.

 $b \times c$

1. 325.
2. 589.
3. 714.
4. 700.

5. 735.
6. 567.
7. 1044.
8. 462.
9. 638.
10. 1072.

 $c \times d$

1. 1475.
2. 1922.
3. 3150.
4. 3010.
5. 4753.
6. 2133.
7. 5684.
8. 2508.
9. 1363.
10. 6633.

 $b \times f$

1. 7605.
2. 12,787.
3. 12,665.
4. 17,680.
5. 8685.
6. 20,601.
7. 14,256.
8. 9142.
9. 19,338.
10. 15,792.

 $c \times e$

1. 6875.
2. 11,284.
3. 15,456.
4. 14,315.
5. 14,553.
6. 13,419.
7. 21,170.
8. 19,371.
9. 20,155.
10. 31,691.

 $d \times f$

1. 34,515.
2. 41,726.
3. 55,875.
4. 76,024.
5. 56,163.
6. 77,499.
7. 77,616.
8. 49,628.
9. 41,313.
10. 97,713.

 $e \times f$

1. 160,875.
2. 244,972.
3. 274,160.
4. 361,556.
5. 171,963.
6. 487,557.
7. 289,080.
8. 383,311.
9. 610,905.
10. 466,851.

 $c \times g$

1. 137,050.
2. 215,357.
3. 319,242.
4. 293,265.
5. 482,454.
6. 186,624.
7. 466,668.
8. 309,111.
9. 228,984.
10. 391,481.

 $d \times g$

1. 323,438.
2. 430,714.
3. 570,075.
4. 720,594.
5. 955,062.

6. 546,048.
7. 788,508.
8. 711,892.
9. 371,112.
10. 578,457.

 $e \times g$

1. 1,507,550.
2. 2,528,708.
3. 2,797,168.
4. 3,427,011.
5. 2,924,262.
6. 3,435,264.
7. 2,936,790.
8. 5,498,429.
9. 5,487,720.
10. 2,763,739.

 $g \div a$

1. 2741.
2. 1389; 2.
3. 844; 5.
4. 1197.
5. 895; 1.
6. 1728.
7. 1005; 6.
8. 1561; 1.
9. 658.
10. 1947; 2.

 $i \div a$

1. 132,016.
2. 117,835.
3. 40,937; 6.
4. 128,394; 6.
5. 40,075; 7.
6. 198,440; 1.
7. 111,184; 4.
8. 115,958; 1.
9. 65,544; 2.
10. 309,921.

 $e + b$

1. 21; 2.
2. 19; 3.
3. 21; 11.
4. 20; 9.
5. 19; 12.
6. 23; 14.
7. 20; 5.
8. 41; 13.
9. 31; 13.
10. 29; 9.

 $g \div d$

1. 92; 54.
2. 112; 3.
3. 101; 26.
4. 97; 37.
5. 101; 49.
6. 87; 39.
7. 82; 10.
8. 123; 19.
9. 168.
10. 59; 2.

 $h \div d$

1. 247; 5.
2. 413; 51.
3. 930; 15.
4. 488; 12.
5. 759; 70.
6. 504.
7. 946; 16.
8. 743; 71.
9. 186; 43.
10. 792; 46.

 $h \div e$

1. 583; 3.
2. 827; 20.
3. 1661; 3.
4. 1199; 15.
5. 1503; 46.

6. 1474; 18.
7. 1598; 40.
8. 1713; 10.
9. 3028; 23.
10. 1170; 64.

$$i \div d$$

1. 4475; 7.
2. 9502; 51.
3. 4912; 39.
4. 10,450; 64.
5. 4544; 64.
6. 10,047; 48.
7. 9076; 28.
8. 9154; 45.
9. 16,734; 32.
10. 9391; 54.

$$g \div f$$

1. 9; 217.
2. 10; 217.
3. 10; 151.
4. 9; 423.
5. 17; 3.
6. 7; 45.
7. 10; 126.
8. 14; 225.
9. 8; 864.
10. 5; 908.

$$h \div f$$

1. 24; 538.
2. 38; 83.

3. 93; 480.
4. 47; 432.
5. 127; 160.
6. 40; 577.
7. 117; 60.
8. 86; 381.
9. 99; 814.
10. 79; 481.

$$h \div e$$

1. 53; 3.
2. 70; 177.
3. 189; 213.
4. 102; 262.
5. 248; 37.
6. 80; 56.
7. 254; 14.
8. 96; 187.
9. 126; 265.
10. 165; 409.

$$i \div f$$

1. 451; 197.
2. 875; 300.
3. 494; 409.
4. 1016; 620.
5. 761; 213.
6. 809; 132.
7. 112; 242.
8. 1065; 304.
9. 894; 704.
10. 942; 9.

$$i \div g$$

1. 565; 177.
2. 1514; 229.
3. 437; 485.
4. 1643; 43.
5. 479; 152.
6. 2577; 45.
7. 1254; 390.
8. 1159; 349.
9. 925; 280.
10. 993; 815.

Page 181

1. 9.
2. 16.
3. $19\frac{1}{2}$.
4. 2.
5. $1\frac{1}{2}$.
6. $6\frac{1}{2}$.
7. $14\frac{1}{2}$.
8. $6\frac{1}{2}$.
9. $\frac{1}{2}$.
10. $3\frac{1}{2}$.
11. $\frac{1}{2}$.
12. $1\frac{1}{2}$.
13. $\frac{3}{4}$.
14. $13\frac{1}{2}$.
15. $1\frac{1}{2}$.
1. 28.
2. $65\frac{1}{2}$.
3. $77\frac{1}{2}$.

$$4. 100\frac{1}{2}$$

$$5. 55\frac{2}{3}$$

Page 183

1. 619.
2. 1350.
3. 792.
4. 3208.
5. 89.
6. 421,400.
7. 17,764.
8. 320 ft.
9. \$1.62.
10. \$1.65.
11. 5 yr.
12. 19¢.

Page 184

1. 12 lb.
2. 65 gal.
3. 9 yd.
4. 12 hr.
5. 25 bu.
6. 14 yd.
7. 16 wk. 4 da.
8. 14,300 lb.
9. 319 gal.
10. \$9.25.
1. \$176.
2. \$2707.50.
3. \$66.
4. \$80.84.
5. \$356.25.

ANSWERS

BOOK II, PART I (3-vol. ed.)

BOOK I, CHAP. III (2-vol. ed.)

NOTE. — The first page-number refers to the 3-vol. ed.; the second, to the 2-vol. ed.

Page 4; 188		14. 39890.	46. 27.	78. 17872.
1. 1574.	15. 80263.	47. 29357.	79. 84787.	80. 56202.
2. 1982.	16. 15134.	48. 4498.	81. 314338.	82. 33492.
3. 2058.	17. 29136.	49. 86676.	50. 18982.	83. 9396.
4. 3113.	18. 42206.	51. 87979.	52. 31966.	84. 17606.
5. 16471.	19. 11813.	53. 1988.	54. 3158.	85. 32891.
6. 41466.	20. 842.	55. 8939.	56. 41888.	86. 57282.
7. 38525.	21. 252726.	57. 24443.	58. 39234.	87. 75410.
8. 40402.	22. 28380.	59. 2416.	60. 1341.	88. 61539.
	23. 41138.	61. 372113.	62. 873.	89. 11428.
	24. 79058.	63. 33356.	64. 39168.	90. 15324.
	25. 27825.	65. 52438.	66. 28911.	
	26. 44045.	67. 4726.	68. 3037.	Page 8; 192
	27. 24410.	69. 2274.	70. 60702.	4. \$ 186.
	28. 39169.	71. 11579.	72. 204700.	5. \$ 302.45.
	29. 9539.	73. 39090.	74. 16516.	6. \$ 119.32.
	30. 59860.	75. 46445.	76. 13264.	7. \$ 183.36.
	31. 264305.	77. 21643.		8. \$ 441.75.
	32. 176320.			9. \$ 442.26.
	33. 2048.			10. \$ 162.54.
	34. 62542.			11. \$ 369.75.
	35. 18620.			12. \$ 581.67.
	36. 57309.			13. \$ 1214.01.
	37. 46053.			14. \$ 5490.54.
	38. 57041.			15. \$ 4894.56.
	39. 75248.			16. \$ 2239.05.
	40. 3658.			17. \$ 3979.86.
	41. 50033.			18. \$ 6410.25.
	42. 209812.			19. \$ 6404.15.
	43. 7348.			20. \$ 180.93.
	44. 44936.			
	45. 14271.			

21. \$5714.73.
 22. \$2425.44.
 23. \$6529.55.
 24. \$351.00.
 25. \$4481.16.
 26. \$8164.32.
 27. \$678.61.
 28. \$570.75.

Page 11; 195

2. 67 ft.
 3. 76; 16 yd.
 4. 164 mi.; 24 mi.
 5. 124; 44.
 6. 1900.
 7. 800.
 8. 25.
 9. \$461.
 10. 46; 18.
 11. 123; 51.
 12. 99; 80.
 13. 56; 24.
 14. 79; 15.
 15. 147; 76.
 16. 151; 50.
 17. 403; 3.
 18. 191; 90.
 19. 423; 22.
 20. 2029; 17.
 21. 1218; 514.
 22. 596; 263.
 23. 770; 558.
 24. 1011; 585.
 25. \$1337.
 26. \$328; \$18 undivided.
 27. \$110; \$1 undivided.
 28. \$1124; \$29 undivided.

Page 12; 196

1. 7809.
 2. 80050.
 3. 703755.
 4. 39.
 5. 759.
 6. 24.
 7. \$3.
 8. 20 bbl.
 9. \$465.98.
 10. 28.
 11. 2333½.

Page 13; 197

1. \$134.11; Smith.
 2. \$6.77 and one \$6.78.
 3. \$234.
 4. 34 bu. and 30¢ yet unpaid.
 5. \$289.
 6. \$11.95.
 7. \$1695.
 8. \$2160; the house.
 9. 46 ft.

Page 18; 202

2. 329,832.
 3. 665,280.
 4. 809,951.
 5. 239,765.
 6. 561,446.
 7. 587,736.
 8. 345,144.
 9. 410,163.
 10. 300,352.
 11. 803,656.
 12. 621,453.
 13. 599,256.

14. 672,670.
 15. 564,682.
 16. 690,656.
 17. 7,883,106.
 18. 7,324,332.
 19. 5,489,727.
 20. 2,548,623.
 21. 3,346,830.
 22. 7,350,260.
 1. \$518.84.
 2. \$351.12.
 3. \$1424.

Page 23; 207

1. \$175; \$425.
 2. \$13.60.
 3. \$63.
 4. \$93; \$279.
 5. \$220.
 6. \$4050.
 7. 99 ft.
 8. 9 in.
 9. 5 sq. in.
 10. 10 in.; 6½ sq. in.
 11. ½; \$1.84.
 12. ½.
 13. 5 yr.
 14. ½; \$0.75.
 15. \$32.25.
 16. \$0.84.

Page 26; 210

2. 12 sq. yd.
 3. \$2.50; \$7.50.
 4. 93½ acres.
 5. 282 ft.
 6. 3136.
 7. ½.
 8. 959 apples.
 9. 120 acres.

10. 9600 sq. rd.
 11. 60 acres.
 12. 206 oranges.
 13. \$560.
 14. \$4629.

Page 30; 214

2. \$281.25.
 3. \$336.
 4. \$26.25.
 5. \$42.75.
 7. 2592.
 8. 10 da., and 37 tons left.
 9. \$334.47.
 10. 192 sq. in.
 11. \$33.75.
 12. \$735.
 13. \$756.

Page 31; 215

1. ¼; \$15.
 2. \$74.
 3. ½; \$1080.
 4. \$195.
 5. \$310; \$1240
 6. \$22.50.
 7. 2540.
 8. 43; 989.
 9. ½; \$93.
 10. \$421.
 11. ½; 549½.
 12. \$2940.
 13. ½; 444.
 14. \$744.
 15. \$129.78.

Page 33; 217

1. 24 lots.
 2. \$220.
 3. 80 carriages.

4. 108 lots.

5. 93.

6. 66.

7. 72.

8. 30.

9. 60.

10. 120.

11. \$22.75.

12. \$6.05 nearly.

13. \$5.01 +.

14. \$8.76 -.

15. \$29.17 -.

16. \$38.78 +.

17. \$11.04 -.

18. \$1.17.

19. \$2.67.

20. \$20.03.

21. \$9.76.

22. \$12.96.

23. \$2.98.

24. \$2.38.

25. \$45.68.

26. \$4.37.

27. \$0.06.

28. \$0.21.

29. \$2.09.

30. \$25.32.

Page 36; 220

1. 18; 50¢.

2. \$14.

3. 716.

4. 186 sq. ft.

5. \$11.56.

6. \$24.86.

7. 654.

8. 6274.

9. 505.

10. \$4290.

11. \$8.83.

12. 12 in.

13. 8640 sq. ft.

14. \$3240.

15. \$20.90.

16. \$4.05.

17. \$1814.40.

Page 37; 221

1. \$12.32.

2. \$12.73.

3. \$38.35.

4. 178.

5. 9.

6. 9600.

7. \$805.

8. \$1706.25.

9. \$2009.25.

10. \$199.80.

11. \$1828.13.

12. \$214.

13. \$1.20.

14. 65 gal.

Page 43; 227

A. \$14,174.35.

B. \$28,181.01.

C. \$15,611.14.

D. \$23,499.27.

E. \$235.84.

F. \$3,208,160.56.

1. \$741,080.62.

2. \$483,594.53.

3. \$103,813.28.

4. \$915,979.32.

5. \$51,321.74.

6. \$907,247.81.

7. \$86,824.87.

8. \$2099.03.

9. \$4485.56.

10. \$4473.25.

11. \$15054.52.

12. \$22136.90.

13. \$2386.53.

14. \$2374.22.

15. \$12955.49.

16. \$20037.96.

17. \$12.31.

18. \$10668.96.

19. \$17651.43.

20. \$10581.27.

21. \$17663.74.

22. \$7082.47.

23. 2,370,633.

24. 8496776.

25. 5054632.

26. 4500023.

27. 4563694.

28. 7233141.

29. 2501973.

30. 2989821.

31. 3320043.

Page 48; 232

1. 104 mi.

2. 21.

3. 8.

4. 64.

5. \$3760.

6. \$6.75.

7. \$2800.

8. 195 A.

9. \$5.77.

10. \$944.

11. \$10.

12. 71 yr.

Page 50; 234

18. $21\frac{1}{2}$ mi.

19. $20\frac{1}{2}$ bu.

20. $21\frac{1}{2}$ T.

21. $29\frac{1}{2}$ yd.

22. \$6.25.

23. $32\frac{1}{2}$ bu.

Page 56; 240

1. $\frac{2}{3}$.

2. $1\frac{1}{2}$.

3. $\frac{2}{3}$.

4. $\frac{2}{3}$.

5. $\frac{1}{15}$.

6. $\frac{1}{240}$.

7. $\frac{1}{24}$.

8. $\frac{1}{2}$.

9. $\frac{1}{12}$.

10. $\frac{1}{10}$.

11. $\frac{1}{15}$.

12. $1\frac{1}{2}$.

13. $\frac{1}{2}$.

14. $1\frac{1}{2}$.

Page 57; 241

Sum; diff.

9. $\frac{3}{10}$; $\frac{1}{10}$.

10. $\frac{2}{3}$; $\frac{1}{3}$.

11. $\frac{1}{15}$; $\frac{1}{15}$.

12. $1\frac{2}{3}$; $1\frac{1}{3}$.

13. $1\frac{1}{2}$; $\frac{1}{2}$.

14. $1\frac{1}{2}$; $1\frac{1}{2}$.

15. $\frac{1}{3}$; $\frac{1}{3}$.

16. $1\frac{1}{2}$; $2\frac{1}{2}$.

17. $2\frac{1}{2}$; $2\frac{1}{2}$.

18. $\frac{1}{15}$; $\frac{1}{15}$.

19. $1\frac{1}{2}$; $1\frac{1}{2}$.

20. $\frac{1}{3}$; $\frac{2}{3}$.

22. 10.

23. $9\frac{1}{2}$.

24. $15\frac{1}{2}$.

25. $15\frac{1}{2}$.

26. $12\frac{1}{2}$.

Page 59; 243

Sum; diff.

2. $1\frac{1}{2}$; $\frac{1}{2}$.

3. $1\frac{1}{2}$; $1\frac{1}{2}$.

4. $1\frac{1}{5}$; $\frac{2}{5}$.

- Sum; dif.
5. $1\frac{5}{12}$; $\frac{1}{24}$.
 6. $1\frac{1}{3}$; $\frac{1}{12}$.
 7. $1\frac{1}{3}$; $\frac{1}{6}$.
 8. $1\frac{2}{3}$; $\frac{1}{3}$.
 9. $\frac{2}{3}$; $\frac{1}{3}$.
 10. $1\frac{7}{25}$; $1\frac{17}{250}$.
 12. $165\frac{1}{4}$.
 13. $283\frac{3}{8}$.
 14. $3\frac{3}{8}$.
 15. $22\frac{3}{8}$.
 16. $37\frac{3}{8}$.
 17. $43\frac{3}{8}$.
 18. $77\frac{5}{8}$; $49\frac{3}{8}$.
 19. $44\frac{1}{2}$; $4\frac{5}{8}$.
 20. $32\frac{3}{8}$; $4\frac{5}{8}$.
 21. $87\frac{5}{8}$; $7\frac{5}{8}$.
 22. $100\frac{3}{8}$; $12\frac{3}{8}$.
 23. $80\frac{3}{8}$; $4\frac{3}{8}$.

Page 60; 244

1. $1\frac{1}{2}$.
2. $1\frac{1}{4}$.
3. $1\frac{1}{4}$.
4. $1\frac{1}{4}$.
5. $1\frac{1}{10}$.
6. $1\frac{1}{10}$.
7. $1\frac{1}{10}$.
8. $1\frac{1}{10}$.
9. $1\frac{1}{10}$.
10. $1\frac{1}{10}$.
11. $1\frac{1}{10}$.
12. $1\frac{1}{10}$.
13. $1\frac{1}{10}$.
14. $1\frac{1}{10}$.

15. $1\frac{1}{2}$.
16. $1\frac{1}{2}$.
17. $1\frac{1}{2}$.
18. $1\frac{1}{2}$.
19. $1\frac{1}{2}$.
20. $1\frac{1}{2}$.
21. $6\frac{1}{2}$.
22. $5\frac{1}{2}$.
23. $3\frac{1}{2}$.
24. $5\frac{1}{2}$.
25. $2\frac{1}{2}$.
26. $\frac{5}{2}$.
27. $1\frac{1}{2}$.
28. $4\frac{1}{2}$.
29. $1\frac{1}{2}$.
30. $4\frac{1}{2}$.
31. $36\frac{1}{2}$.
32. $25\frac{1}{2}$.
33. $12\frac{1}{2}$.
34. $8\frac{1}{2}$.
35. $19\frac{1}{2}$.
36. $36\frac{1}{2}$.
37. $40\frac{1}{2}$.
38. $28\frac{1}{2}$.
39. $65\frac{1}{2}$.
40. $70\frac{1}{2}$.
41. $69\frac{1}{2}$.
42. $82\frac{1}{2}$.
43. $73\frac{1}{2}$.
44. $52\frac{1}{2}$.
45. $30\frac{1}{2}$.
46. $1\frac{1}{2}$.
47. $1\frac{1}{2}$.
48. $1\frac{1}{2}$.
49. $1\frac{1}{2}$.
50. $1\frac{1}{2}$.
51. $1\frac{1}{2}$.
52. $\frac{3}{2}$.
53. $1\frac{1}{2}$.
54. $\frac{3}{2}$.
55. $1\frac{1}{2}$.

56. $1\frac{1}{2}$.
57. $1\frac{1}{2}$.
58. $1\frac{1}{2}$.
59. $1\frac{1}{2}$.
60. $1\frac{1}{2}$.
61. $1\frac{1}{2}$.
62. $\frac{3}{2}$.
63. $1\frac{1}{2}$.
64. $1\frac{1}{2}$.
65. $1\frac{1}{2}$.
66. $\frac{3}{2}$.
67. $1\frac{1}{2}$.
68. $1\frac{1}{2}$.
69. $1\frac{1}{2}$.
70. $1\frac{1}{2}$.
71. $1\frac{1}{2}$.
72. $\frac{3}{2}$.
73. $\frac{3}{2}$.
74. $1\frac{1}{2}$.
75. $1\frac{1}{2}$.
76. $3\frac{1}{2}$.
77. $4\frac{1}{2}$.
78. $6\frac{1}{2}$.
79. $3\frac{1}{2}$.
80. $7\frac{1}{2}$.
81. $16\frac{1}{2}$.
82. $28\frac{1}{2}$.
83. $44\frac{1}{2}$.
84. $45\frac{1}{2}$.
85. $37\frac{1}{2}$.
86. $9\frac{1}{2}$.
87. $19\frac{1}{2}$.
88. $30\frac{1}{2}$.
89. $37\frac{1}{2}$.
90. $22\frac{1}{2}$.
91. $76\frac{1}{2}$.
92. $83\frac{1}{2}$.
93. $108\frac{1}{2}$.
94. $75\frac{1}{2}$.
95. $59\frac{1}{2}$.
96. $60\frac{1}{2}$.

97. $54\frac{1}{2}$.
98. $64\frac{1}{2}$.
99. $29\frac{1}{2}$.
100. $21\frac{1}{2}$.
101. $94\frac{1}{2}$.
102. $118\frac{1}{2}$.
103. $122\frac{1}{2}$.
104. $105\frac{1}{2}$.
105. $72\frac{1}{2}$.
106. $144\frac{1}{2}$.
107. $153\frac{1}{2}$.
108. $156\frac{1}{2}$.
109. $98\frac{1}{2}$.
110. $71\frac{1}{2}$.
111. $17\frac{1}{2}$.
112. $35\frac{1}{2}$.
113. $13\frac{1}{2}$.
114. $29\frac{1}{2}$.
115. $12\frac{1}{2}$.
116. $77\frac{1}{2}$.
117. $89\frac{1}{2}$.
118. $78\frac{1}{2}$.
119. $59\frac{1}{2}$.
120. $34\frac{1}{2}$.
121. $2\frac{1}{2}$.
122. $1\frac{1}{2}$.
123. $1\frac{1}{2}$.
124. $1\frac{1}{2}$.
125. $2\frac{1}{2}$.
126. $1\frac{1}{2}$.
127. $1\frac{1}{2}$.
128. $1\frac{1}{2}$.
129. $1\frac{1}{2}$.
130. $2\frac{1}{2}$.
131. $1\frac{1}{2}$.
132. $1\frac{1}{2}$.
133. $2\frac{1}{2}$.
134. $1\frac{1}{2}$.
135. $1\frac{1}{2}$.
136. $80\frac{1}{2}$.
137. $87\frac{1}{2}$.

138. $115\frac{3}{4}$.
 139. $79\frac{1}{2}$.
 140. $67\frac{7}{8}$.
 141. $157\frac{1}{2}$.
 142. $177\frac{9}{16}$.
 143. $193\frac{1}{2}$.
 144. $139\frac{5}{8}$.
 145. $101\frac{1}{8}$.
 146. $148\frac{7}{8}$.
 147. $157\frac{1}{2}$.
 148. $163\frac{7}{8}$.
 149. $102\frac{3}{4}$.
 150. $79\frac{7}{8}$.

Page 61; 245

2. 200 A.
 3. $\frac{1}{4}$.
 4. $\frac{5}{4}$; $\frac{5}{8}$; $\frac{1}{2}$.
 5. \$515.
 6. 230 mi.
 7. \$131.20.
 8. \$79.10.
 9. \$3587.
 10. $\frac{1}{16}$.
 11. 168 A.
 12. $\frac{1}{2}$; \$4.50.
 13. 476 bu.

Page 62; 246

1. \$1.87.
 2. $\frac{3}{8}$; \$155.
 3. 24¢; 30¢; 45¢.
 4. 319 mi.
 5. \$3400; 4250.
 6. 21; 30.
 8. 200 sheep.
 9. 12,462 whites.
 10. \$3000.

Page 65; 249

4. $\frac{1}{2}$; $\frac{1}{2}$.
 5. $1\frac{1}{2}$.
 6. $8\frac{1}{2}$.
 7. $1\frac{1}{2}$.
 8. $1\frac{1}{2}$.
 9. $9\frac{1}{2}$.
 10. $5\frac{1}{2}$.
 11. $2\frac{1}{2}$.
 12. $2\frac{1}{2}$.
 13. $4\frac{1}{2}$.
 14. $1\frac{1}{2}$.
 15. $1\frac{1}{2}$.
 16. $3\frac{1}{2}$.
 20. $2\frac{1}{2}$.
 21. $16\frac{1}{2}$.
 22. $5\frac{1}{2}$.
 23. $8\frac{1}{2}$.
 24. 20.
 25. 24.

Page 66; 250

13. \$45.
 14. \$306.
 16. $301\frac{1}{2}$.
 17. $388\frac{3}{4}$.
 18. $2257\frac{1}{2}$.
 19. $2133\frac{1}{2}$.
 20. $1666\frac{3}{4}$.
 21. $2187\frac{1}{2}$.
 22. 1350.
 23. $1435\frac{1}{2}$.
 24. $453\frac{1}{2}$.
 25. $838\frac{3}{4}$.
 26. $3174\frac{3}{4}$.
 27. \$45.83 $\frac{1}{2}$.
 28. \$20.37 $\frac{1}{2}$.
 29. \$4.65 $\frac{1}{2}$.
 30. \$22.57 $\frac{1}{2}$.
 31. \$30.68.
 32. \$120.35.

Page 67; 251

1. $9.98\frac{1}{2}$.
 2. 453 sq. in.
 3. \$139.50.
 4. $71\frac{1}{2}$ in.
 5. $89\frac{1}{4}$ ft.
 6. 510 mi.
 7. \$78 $\frac{3}{4}$.
 8. \$66.38 $\frac{3}{4}$.
 9. \$109.97 $\frac{1}{2}$.
 10. \$48.08 $\frac{1}{2}$.
 11. 36 cd.
 12. \$16.20.
 13. 105 qt.
 14. \$1.60.
 15. \$86 $\frac{1}{2}$.
 16. \$1.65 $\frac{1}{2}$.
 17. \$2.95 $\frac{1}{2}$.

Page 72; 256

1. \$2.00.
 2. \$30.
 3. \$180.
 4. $\frac{2}{3}$ as much.
 5. \$0.68.
 6. \$3.62.
 7. \$4.50.
 8. \$192.
 9. $272\frac{1}{2}$ sq. ft.
 10. $5\frac{1}{2}$ yd., $27\frac{1}{2}$ yd.
 11. 49 sq. in.
 12. $1\frac{1}{8}$ ft.
 13. \$16,800.
 14. $110\frac{7}{8}$.
 15. 24.
 16. $\frac{2}{3}$.
 17. $\frac{2}{3}$.

Page 75; 259

2. $80\frac{5}{8}$.
 3. $76\frac{1}{2}$.
 4. $71\frac{9}{16}$.
 5. $75\frac{3}{4}$.
 6. $43\frac{3}{4}$.
 7. $24\frac{1}{2}$.
 9. $18\frac{3}{4}$.
 10. $16\frac{5}{16}$.
 11. $35\frac{1}{16}$.
 12. $40\frac{9}{16}$.
 13. $28\frac{5}{16}$.
 14. $22\frac{7}{16}$.
 15. $33\frac{9}{16}$.
 16. $8\frac{1}{2}$.
 17. $11\frac{3}{4}$.
 18. $35\frac{1}{4}$.
 19. $10\frac{9}{16}$.
 20. $8\frac{5}{8}$.
 21. $12\frac{3}{8}$.
 22. $14\frac{3}{8}$.
 23. $34\frac{3}{8}$.
 24. $1966\frac{7}{8}$.
 25. 48 rd. 8 ft.
 26. 59 rd. $1\frac{1}{2}$ ft.

Page 76; 260

1. $1\frac{1}{8}$.
 2. $1\frac{1}{4}$.
 3. $1\frac{1}{8}$.
 4. $1\frac{2}{5}$.
 5. $1\frac{1}{4}$.
 6. $1\frac{1}{5}$.
 7. $1\frac{2}{5}$.
 8. $2\frac{1}{5}$.
 9. $1\frac{1}{5}$.
 10. $\frac{5}{8}$.
 11. $\frac{3}{4}$.
 12. $1\frac{7}{8}$.

13. $12\frac{1}{2}$.14. $3\frac{1}{2}$.

Page 77; 261

2. $\frac{7}{8}$.3. $\frac{4}{5}$.4. $\frac{7}{10}$.5. $\frac{1}{2}$.6. $1\frac{1}{2}$.7. $1\frac{1}{2}$.8. $1\frac{1}{10}$.9. $1\frac{1}{10}$.10. $1\frac{1}{10}$.11. $1\frac{1}{27}$.12. $4\frac{1}{2}$.13. $\frac{1}{2}$.14. $2\frac{1}{10}$.15. $1\frac{1}{10}$.16. $2\frac{2}{10}$.17. $\frac{2}{10}$.18. $\frac{2}{10}$.19. $1\frac{1}{10}$.20. $8\frac{1}{10}$.21. $18\frac{1}{10}$.22. $80\frac{1}{10}$.

23. 48.

24. $1\frac{1}{10}$.25. $3\frac{1}{2}$.26. $1\frac{1}{2}$.27. $2\frac{1}{2}$.28. $1\frac{1}{10}$.29. $7\frac{1}{10}$.30. $5\frac{1}{10}$.

31. 4.

32. 7.

33. $1\frac{1}{2}$.34. $5\frac{1}{2}$.35. $16\frac{1}{2}$.

Page 79; 263

1. 32.

2. 12.

3. $\frac{1}{2}$.4. $11\frac{1}{10}$.

5. 8.

6. $\frac{7}{8}$.7. $\frac{1}{2}$.8. $\frac{1}{2}$.9. $\frac{1}{10}$; $\frac{1}{10}$.10. $\frac{1}{2}$; $\frac{1}{2}$.

11. 9.

13. $\frac{1}{10}$.14. $10\frac{1}{2}$ hr.15. $7\frac{1}{2}$.16. $1\frac{1}{2}$.

17. 120.

18. $14\frac{1}{10}$.19. $2\frac{1}{2}$.20. $16\frac{1}{10}$.21. $6\frac{1}{10}$.22. $105\frac{1}{10}$.23. $\$49\frac{1}{10}$.

Page 81; 265

1. $53\frac{1}{2}$.2. $13\frac{1}{10}$.

3. 5280.

4. $36\frac{1}{10}$.5. $16\frac{1}{2}$; 66.6. $272\frac{1}{2}$.7. $\$0.81$.8. $\$7.46$.9. $\$19.69$.10. $\$4.43$.11. $\$4.12$.12. $\$2.41$.13. $\$2.74$.14. $\$1.67$.

15. 230 lb.

16. $\frac{7}{15}$ is $\frac{1}{2}$ of $\frac{7}{3}$.17. $\frac{1}{10}$ is $\frac{1}{2}$ of $\frac{1}{5}$.18. $\$46\frac{1}{2}$.19. $284\frac{1}{2}$.20. $22\frac{1}{10}$.21. $\$175$.22. $\$2800$.23. $\$3200$.

Page 83; 267

1. $\$64$.2. $\$64$.3. $\$2560$.4. $\$4720$.5. $\$25$.6. $\frac{1}{2}$, $\frac{1}{2}$, $\frac{1}{2}$, $\frac{1}{2}$.7. $\frac{1}{10}$, $\frac{1}{10}$, $\frac{1}{10}$, $\frac{1}{10}$.8. $\frac{1}{10}$, $\frac{1}{10}$, $\frac{1}{10}$, $\frac{1}{10}$.9. $\frac{1}{10}$, $\frac{1}{10}$, $\frac{1}{10}$, $\frac{1}{10}$.10. $\frac{1}{10}$, $\frac{1}{10}$, $\frac{1}{10}$, $\frac{1}{10}$.11. $\frac{1}{10}$.12. $\frac{1}{10}$.13. $\frac{1}{10}$.14. $\frac{1}{10}$.15. $\frac{1}{10}$.16. $13968\frac{1}{10}$.17. $80\frac{1}{10}$.18. $772\frac{1}{10}$.19. $\frac{1}{10}$.20. $59\frac{1}{10}$.21. $50\frac{1}{10}$.22. $\frac{1}{10}$.23. $\frac{1}{10}$.

24. 20.

25. $\$690$.

26. 150 lb.

Page 88; 272

1. 30.196.

2. 101.218.

3. 101.992.

4. 31.981.

5. 93.47.

6. 17.318.

7. 6.097.

8. 14.886.

9. 20.241.

10. 108.784.

11. 236.669.

12. 8.289.

13. 14.144.

14. 102.687.

15. 230.572.

16. 5.855.

17. 94.398.

18. 222.283.

19. 88.543.

20. 216.428.

21. 17.427.

22. 27.423.

24. 1.452.

25. 2.115.

26. 0.721.

27. 5.083.

28. 1.51.

29. 1.11.

Page 92; 276

3. 6.156.

4. 5.52.

5. 20.884.

6. 165.87.

7. 8.366.

8. 3.492.

9. 0.156.

10. 0.855.

11. 1.737.

12. 333.

13. 0.081.

14. 0.512.

15. $\$810$.16. $\$200.60$.

17. 129.2.

18. 675 bu.

19. $\$1687.50$.20. $\$1120$.21. $\$520.20$.

ANSWERS

21

Page 93; 277

2. 73.204.
3. 1.192.
4. 16.61 T.
5. 46.48 A.
6. 9.8 maple;
14.7 oak.
7. 104.85;
262.125;
716.475.
8. 63.
9. \$4080.
10. \$59.34.
11. \$14.25.
12. 0.19.
13. 32 %.

Page 94; 278

8. 1.068 +.
9. 3.2.
10. 213.33 +.
11. 24.4375.
12. 38.52.
13. 14.722 +.
14. 3.047 +.
15. 0.598 -.
16. 0.3727 +.
17. 1.147.
18. 7.916 +.
19. 9.33 +.

Page 99; 283

7. \$12.50.
8. \$11.48.
9. \$7.69.

Page 100; 284

1. \$18.56.
2. \$10.27.
3. \$97.75.
4. \$8.03.
5. \$7.37.

6. \$138.50.
7. \$14.96.
8. \$9.24.
9. \$11.19.
10. \$29.26.

Page 101; 285

3. \$20.75.
4. \$2.53.
5. \$11.24.

Page 102; 286

3. 6.
5. 30.
6. $\frac{1}{12}$.
7. 56.
8. $\frac{1}{25}$.
12. $27\frac{3}{4}$.
13. $12\frac{1}{2}$.
14. $5\frac{7}{12}$.
15. 11.
16. 12.
17. 4.

Page 104; 288

2. 3×89 .
3. $3 \times 3 \times 17$.
4. $2 \times 3 \times 3 \times 7 \times 7$.
5. $3 \times 3 \times 103$.
6. 5×31 .
7. $5 \times 3 \times 3 \times 7$.
8. $5 \times 3 \times 3 \times 11$.
9. $2 \times 2 \times 131$.
10. $2 \times 2 \times 3 \times 3 \times 3 \times 53$.
11. $5 \times 5 \times 5 \times 3$.
12. $3 \times 3 \times 671$.
13. $2 \times 3 \times 3 \times 13$.
14. $2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 3$.

15. $2 \times 2 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3$.
16. $2 \times 3 \times 3 \times 3 \times 3 \times 19$.
17. $3 \times 3 \times 103$.
20. $5 \times 3 \times 7$.
21. 107×1 .
22. 3×29 .
23. 2×47 .
24. 2×103 .
25. 307×1 .
26. 13×23 .
27. 349×1 .
28. $3 \times 3 \times 23$.
29. $3 \times 3 \times 2 \times 17$.
30. 7×103 .
31. $2 \times 3 \times 3 \times 47$.
32. 1243×1 .
33. 487×1 .
34. $2 \times 2 \times 71$.
35. 2×253 .

Page 107; 291

7. 192 cu. yd.
8. 30 cu. ft.
9. 36 cu. in.
10. 64 cu. in.
11. 60.
12. 64.
13. 288 cu. yd.
14. \$36.

Page 109; 293

1. 16 cu. in.
6. 78 sq. ft.
7. 72 sq. in.
10. 240 cu. in.
11. 248 sq. in.

Page 110; 294

1. 587.
2. 13.

3. 12.
4. 5877.
5. 391 pk.
6. $145\frac{1}{2}$ bu.
7. 104 ft.
8. 4 da.
9. 9 men.
10. \$6215.
11. \$5940.
12. 1008 sq. ft.
13. \$933.50.
14. 252 sq. ft.
15. \$54.75.

Page 111; 295

1. 184 qt.
2. 175 qt.
3. \$248.50.
4. \$68.07.
5. \$10,500.
6. 542.
7. \$3840.
8. \$3060.
9. \$3992.
10. 2011.
11. 13104.
12. 228.
13. 1700.
14. 180 sq. ft.
15. \$75.60.
16. \$22.78.

Page 112; 296

1. \$45.
2. \$24.
3. 54 bu.
4. \$171.62.
5. 632.
6. 9200.
7. 1026.
8. \$1000.

9. \$180.
 10. 16 qt.
 11. 20 in.; 22 in.
 12. 72 in.; 36 in.
 13. 92¢.
 14. \$1.60.
 15. 144.
 16. \$5040.
 17. 40 $\frac{1}{11}$.

Page 113; 297

1. \$3565.80.
 2. \$476.78.
 3. \$1109.
 4. 305 in.
 5. 193.
 6. $\frac{1}{2}$; $\frac{1}{4}$; $\frac{1}{4}$; $\frac{1}{2}$.
 7. 366.
 8. 1056 bu.
 9. \$1568.
 10. 85 ft.
 11. 80 sq. in.
 12. 96 sq. ft.
 13. 9 sq. ft.; 144 sq. ft.
 14. \$135.66.
 15. \$18.48.
 16. 88 qt.

Page 114; 298

1. 8 hr.
 2. \$4950.
 3. 112 sq. ft.
 4. 80 lb.
 5. 14 sq. in.
 7. 118.

8. 2×19 , 2×13 ,
 3×13 ,
 $2 \times 3 \times 7$,
 $2 \times 2 \times 2 \times 7$,
 $3 \times 3 \times 7$,
 $5 \times 5 \times 3$.
 9. 4 da.; 3 da.
 10. 1166.
 11. 295.
 12. 219 oz.
 13. \$1240.
 14. \$180.
 15. 28 $\frac{1}{2}$ ft.
 16. 214 in.

Page 115; 299

1. $\frac{2}{3}$, $\frac{1}{2}$.
 2. $\frac{5}{8}$, $\frac{1}{3}$.
 3. $\frac{1}{2}$, $\frac{1}{4}$.
 4. $\frac{1}{2}$, $\frac{2}{3}$.
 5. $\frac{3}{8}$, $\frac{1}{16}$.
 6. $\frac{3}{4}$, 63 $\frac{2}{5}$.
 7. $\frac{11}{15}$, 65 $\frac{4}{15}$.
 8. $\frac{4}{15}$, 62 $\frac{1}{2}$.
 9. $\frac{21}{7}$, 32 $\frac{3}{10}$.
 10. $\frac{11}{9}$, $\frac{12}{15}$.
 11. $\begin{cases} 2 \times 3 \times 2 \times 2 \times 5 \times 5 \\ 3 \times 3 \times 2 \times 2 \times 2 \times 2 \times 5. \end{cases}$
 12. $\begin{cases} 2 \times 3 \times 2 \times 2 \times 2 \times 2 \times 7 \\ 2 \times 2 \times 3 \times 37. \end{cases}$
 13. $\begin{cases} 2 \times 5 \times 3 \times 3 \times 3 \times 3 \\ 5 \times 3 \times 3 \times 17. \end{cases}$
 14. $\begin{cases} 5 \times 5 \times 3 \times 7 \\ 5 \times 5 \times 2 \times 2 \times 3 \times 3 \times 2 \times 2. \end{cases}$
 15. $\begin{cases} 3 \times 2 \times 2 \times 3 \times 11 \\ 2 \times 2 \times 3 \times 2 \times 3 \times 2 \times 11. \end{cases}$

16. 52.
 17. 1 $\frac{1}{2}$.
 18. 2 $\frac{1}{2}$.
 19. 163 $\frac{11}{12}$.
 20. 510.
 21. 31 $\frac{1}{11}$.
 22. 55 $\frac{11}{12}$.
 23. 21 $\frac{1}{4}$.
 24. 2 $\frac{1}{16}$.
 25. 29 $\frac{53}{100}$.
 26. 6 $\frac{1}{16}$.
 27. 21 $\frac{5}{8}$.
 28. 62 $\frac{1}{16}$.
 29. 110 $\frac{3}{8}$.
 30. 8.963.
 31. 117 $\frac{3}{8}$.
 32. 315.
 33. 656.
 34. $\frac{2}{3}$.
 35. $\frac{1}{2}$.
 36. 160.
 37. 91 $\frac{1}{2}$.
 38. $\frac{3}{8}$.
 39. $\frac{1}{4}$.
 40. $\frac{1}{12}$.

Page 116; 300

1. \$4015.
 2. 27 ft.
 3. 24 yd.
 4. 24 $\frac{2}{17}$.
 5. \$15.
 6. 52 lb.; 4 lb.
 7. 150 ft.
 8. \$5.04.
 9. \$2500.
 10. 340 bu.
 11. \$6140.
 12. 340 acres.
 13. 136 trees.
 14. 342 bu.
 15. 2 $^6 \times 3^3 \times 5$.

Page 117; 301

1. 411 $\frac{1}{18}$.
 2. 45 $\frac{1}{18}$.
 3. 38 $\frac{17}{18}$.
 4. 1067 $\frac{7}{8}$.
 5. 56 $\frac{1}{8}$.
 6. 79 $\frac{1}{8}$.
 7. 57 $\frac{3}{8}$.
 8. 22 $\frac{3}{8}$.
 9. 7 ch. 75¢ left.
 10. 437 $\frac{1}{2}$ mi.
 11. \$760.
 12. $\frac{2}{3}$ of a ft.
 13. $\frac{2}{3}$ (using 30 da.).
 14. 32 da.
 15. \$1.30.
 16. \$225.00.
 17. \$18.00.

ANSWERS

BOOK II, PART II (3-vol. ed.)

BOOK II, CHAP. I (2-vol. ed.)

NOTE. — The first page-number refers to the 3-vol. ed.; the second, to the 2-vol. ed

Page 125; 7			Page 132; 14
1. 9958.	27. 30,307.	29. 2650; rem. 26.	Addition.
2. 28,338.	28. 261,704.	30. 4108; rem. 10.	1. 59,881.
3. 28,157.	Page 131; 13	31. 1038; rem. 22.	2. 539,382.
4. 28,166.	1. 130,248.	32. 1369; rem. 13.	3. 5,570,546.
5. 19,943.	2. 407,391.	33. 1396; rem. 15.	4. 70,626.
6. 16,512.	3. 743,184.	34. 3359; rem. 110.	5. 661,464.
Columns.	4. 310,362.	35. 3754; rem. 137.	6. 6,956,973.
a. 20,262.	5. 566,955.	36. 655; rem. 92.	7. 80,834.
b. 38,527.	6. 357,048.	37. 724; rem. 94.	8. 757,216.
c. 40,396.	7. 836,847.	38. 748; rem. 433.	9. 8,351,320.
d. 31,879.	8. 649,044.	39. 336; rem. 348.	10. 102,485.
7. 131,064	9. 756,504.	40. \$ 5.67.	11. 915,666.
8. 572.	10. 579,712.	41. \$ 2.17.	12. 9,749,326.
9. 1956.	11. \$ 3578.25.	42. \$ 1.05.	13. 94,937.
10. 84.	12. \$ 4445.65.	43.	14. 917,943.
11. 84.	13. \$ 670.02.	44. \$ 22.15.	15. 9,749,066.
12. 170.	14. \$ 10,364.53.	45. \$.29.	16. 170,927.
13. 161.	15. \$ 178.89½.	46. \$ 31.90.	17. 1,609,125.
14. 304.	16. \$ 78.05.	47. 67; rem. 40.	18. 16,461,548.
15. 146.	17. \$ 633.55½.	48. 5489;	19. 4,163,226.
16. 2696.	18. \$ 280.02½.	rem. 198.	20. 5,396,560.
17. 2696.	19. 1243; rem. 18.	49. \$ 260;	21. 5,410,290.
18. 781.	20. 1282; rem. 6.	rem. \$ 1188.	22. 6,147,249.
20. 6790.	21. 1111; rem. 46.	50. \$ 877;	23. 7,517,239.
21. 168.	22. 544; rem. 15.	rem. \$ 482.	24. 6,888,589.
22. 584.	23. 1292; rem. 25.	51. \$ 318;	25. 4,704,914.
23. 9169.	24. 294; rem. 20.	rem. \$ 1729.	26. 7,609,670.
24. 17,622.	25. 1038; rem. 65.	52. 274; rem. 716.	27. 5,597,529.
25. 146,236.	26. 249; rem. 41.	53. \$ 488;	28. 4,661,840.
26. 16,535.	27. 810; rem. 19.	rem. \$ 624.	29. 54.
	28. 657; rem. 21.	54. 2856;	
		rem. 211.	

a. 153,264.
 b. 358,783.
 c. 979,737.
 d. 344,518.
 e. 797,892.
 f. 713,236.
 g. 751,820.
 h. 606,345.
 i. 923,814.
 j. 548,479.
 k. 473,235.
 l. 832,748.
 m. 726,236.
 n. 724,930.
 o. 1,094,675.
 p. 745,317.
 q. 1,058,727.
 r. 951,103.
 s. 676,213.
 t. 484,432.
 u. 650,523.
 v. 424,606.
 w. 1,039,644.
 x. 406,887.
 y. 1,007,684.
 z. 788,414.

Subtraction.

1.

a. 45,423.
 b. 11,924.
 c. 20,892.
 d. 67,048.
 e. 51,690.
 f. 64,369.
 g. 12,681.
 h. 38,205.
 i. 79,732.
 j. 87,537.
 k. 83,771.
 l. 61,745.

m. 23,168.
 n. 43,961.
 o. 91,964.
 p. 38,896.
 q. 50,353.
 r. 82,015.
 s. 8144.
 t. 91,195.
 u. 67,207.
 v. 63,836.
 w. 47,602.
 x. 89,429.
 y. 70,821.
 z. 44,590.
 2.
 a. 58,108.
 b. 325,583.
 c. 925,305.
 d. 197,186.
 e. 668,698.
 f. 556,469.
 g. 705,508.
 h. 500,393.
 i. 742,813.
 j. 351,101.
 k. 288,634.
 l. 698,965.
 m. 660,437.
 n. 621,750.
 o. 890,479.
 p. 639,694.
 q. 937,861.
 r. 757,898.
 s. 632,555.
 t. 290,050.
 u. 495,558.
 v. 278,166.
 w. 921,403.
 x. 200,627.
 y. 838,147.
 z. 669,035.

3.

a. 1424.
 b. 1107.
 c. 369.
 d. 4102.
 e. 691.
 f. 2333.
 g. 2772.
 h. 263.
 i. 397.
 j. 1771.
 k. 2373.
 l. 3204.
 m. 1511.
 n. 1645.
 o. 2546.
 p. 2499.
 q. 2984.
 r. 684.
 s. 5101.
 t. 2804.
 u. 520.
 v. 1427.
 w. 1528.
 x. 81.
 y. 55.
 4.
 a. 32,075.
 b. 10,075.
 c. 46,525.
 d. 11,256.
 e. 13,370.
 f. 54,021.
 g. 28,296.
 h. 38,891.
 i. 8202.
 j. 5537.
 k. 24,399.
 l. 35,373.
 m. 19,282.
 n. 49,648.

o. 50,522.

p. 8958.
 q. 34,646.
 r. 74,555.
 s. 77,950.
 t. 21,184.
 u. 3891.
 v. 14,807.
 w. 43,355.
 x. 18,527.
 y. 25,386.
 5.
 a. 235,400.
 b. 609,797.
 c. 681,594.
 d. 460,256.
 e. 98,860.
 f. 95,018.
 g. 176,819.
 h. 281,311.
 i. 383,510.
 j. 68,004.
 k. 385,932.
 l. 73,901.
 m. 19,405.
 n. 318,377.
 o. 301,307.
 p. 307,125.
 q. 145,317.
 r. 199,898.
 s. 264,555.
 t. 184,324.
 u. 221,283.
 v. 628,430.
 w. 677,421.
 x. 618,993.
 y. 194,498.
 Multiplication.
 1.
 a. 1638.
 b. 20,160.

- c. 31,213.
 d. 4866.
 e. 24,300.
 f. 15,066.
 g. 10,880.
 h. 29,568.
 i. 21,280.
 j. 17,640.
 k. 18,792.
 l. 82,180.
 m. 8640.
 n. 33,642.
 o. 31,568.
 p. 7500.
 q. 28,350.
 r. 51,744.
 s. 12,312.
 t. 77,220.
 u. 92,400.
 v. 81,282.
 w. 109,446.
 x. 38,157.
 y. 49,248.
 z. 87,234.
 2.
 a. 264,965.
 b. 2,569,632.
 c. 3,382,748.
 d. 1,770,165.
 e. 5,443,244.
 f. 6,914,070.
 g. 4,954,995.
 h. 9,325,368.
 i. 5,876,419.
 j. 3,524,906.
 k. 2,892,043.
 l. 2,608,242.
 m. 2,947,464.
 n. 3,623,759.
 o. 5,377,152.
 p. 7,119,554.
- q. 3,764,299.
 r. 5,952,227.
 s. 8,111,796.
 t. 2,890,708.
 u. 6,073,634.
 v. 4,316,488.
 w. 5,113,188.
 x. 4,422,832.
 y. 6,649,522.
 z. 4,882,128.
 3.
 a. 9,213,296.
 b. 13,635,104.
 c. 21,622,464.
 d. 29,729,181.
 e. 39,144,124.
 f. 56,156,355.
 g. 14,326,254.
 h. 46,219,098.
 i. 74,366,207.
 j. 46,155,425.
 k. 47,206,902.
 l. 54,659,377.
 m. 13,790,088.
 n. 36,902,236.
 o. 82,259,056.
 p. 37,964,082.
 q. 33,019,392.
 r. 57,539,662.
 s. 15,636,852.
 t. 74,570,178.
 u. 69,046,593.
 v. 50,533,752.
 w. 38,053,772.
 x. 48,779,616.
 y. 58,986,241.
 z. 26,998,768.
 4.
 a. 62,902,960.
 b. 40,674,917.
 c. 96,000,768.
- d. 302,638,785.
 e. 501,128,839.
 f. 663,452,466.
 g. 129,983,130.
 h. 451,882,314.
 i. 592,245,893.
 j. 685,981,450.
 k. 487,864,146.
 l. 200,611,866.
 m. 185,576,868.
 n. 233,356,676.
 o. 632,883,072.
 p. 429,812,772.
 q. 368,214,528.
 r. 865,656,314.
 s. 148,567,017.
 t. 348,942,894.
 u. 477,652,098.
 v. 416,135,676.
 w. 406,328,499.
 x. 878,951,282.
 y. 718,211,362.
 z. 535,784,019.
 5.
 a. 4,904,840,768.
 b. 4,999,675,268.
 c. 23,531,408,064.
 d. 19,140,663,347.
 e. 43,751,063,195.
 f. 46,237,307,532.
 g. 14,062,855,084.
 h. 26,133,312,150.
 i. 71,802,434,178.
 j. 42,257,897,900.
 k. 33,720,541,536.
 l. 49,524,287,556.
 m. 20,328,681,798.
 n. 32,685,436,504.
 o. 97,301,344,500.
 p. 32,916,630,432.
 q. 56,530,392,576.
- r. 77,699,217,728.
 s. 10,991,116,194.
 t. 3,646,375,579.
 u. 41,947,242,183.
 v. 24,287,191,272.
 w. 53,692,882,454.
 x. 29,402,798,658.
 y. 73,271,128,154.
 z. 39,380,533,644.
 Division.
 1.
 a. 52,438.
 b. 37,808; rem. 4.
 c. 135,724;
 rem. 5.
 d. 53,695; rem. 4.
 e. 72,873; rem. 5.
 f. 209,958;
 rem. 2.
 g. 90,611; rem. 6.
 h. 49,825.
 i. 207,346;
 rem. 2.
 j. 37,156; rem. 4.
 k. 62,978; rem. 4.
 l. 50,920; rem. 4.
 m. 137,980;
 rem. 3.
 n. 74,499; rem. 7.
 o. 123,609;
 rem. 3.
 p. 171,892.
 q. 142,099.
 r. 77,216.
 s. 108,246;
 rem. 2.
 t. 29,609; rem. 6.
 u. 35,577;
 rem. 15.
 v. 18,313;
 rem. 17.

- v. 57,434;
 rem. 16.
 x. 42,710; rem. 3.
 y. 101,996;
 rem. 2.
 z. 51,676; rem. 4.
 2.
 a. 20; rem. 55.
 b. 34; rem. 49.
 c. 42; rem. 54.
 d. 66; rem. 21.
 e. 103; rem. 4.
 f. 96; rem. 90.
 g. 98; rem. 41.
 h. 112; rem. 69.
 i. 72; rem. 1.
 j. 103; rem. 28.
 k. 62; rem. 73.
 l. 32; rem. 22.
 m. 87; rem. 34.
 n. 53; rem. 70.
 o. 93; rem. 15.
 p. 119; rem. 53.
 q. 71; rem. 89.
 r. 96; rem. 55.
 s. 115; rem. 39.
 t. 37; rem. 15.
 u. 84; rem. 14.
 v. 64; rem. 10.
 w. 84; rem. 81.
 x. 112; rem. 69.
 y. 93; rem. 70.
 z. 146; rem. 61.
 3.
 a. 237; rem. 79.
 b. 15; rem. 773.
 c. 28; rem. 224.
 d. 170; rem. 403.
 e. 92; rem. 53.
 f. 96; rem. 732.
 g. 26; rem. 172.
 h. 48; rem. 450.
 i. 100; rem. 673.
 j. 194; rem. 297.
 k. 168; rem. 366.
 l. 76; rem. 771.
 m. 62; rem. 450.
 n. 64; rem. 300.
 o. 117; rem. 584.
 p. 60; rem. 294.
 q. 97; rem. 475.
 r. 145; rem. 273.
 s. 18; rem. 291.
 t. 120; rem. 553.
 u. 78; rem. 603.
 v. 96; rem. 304.
 w. 79; rem. 323.
 x. 198; rem. 138.
 y. 108; rem. 7.
 z. 109; rem. 369.
 4.
 a. 77; rem. 1311.
 b. 122; rem. 2458.
 c. 245; rem. 453.
 d. 63; rem. 1044.
 e. 87; rem. 2546.
 f. 69; rem. 6254.
 g. 108; rem. 754.
 h. 57; rem. 7886.
 i. 121; rem. 1025.
 j. 61; rem. 4358.
 k. 69; rem. 649.
 l. 246; rem. 2680.
 m. 109; rem. 3421.
 n. 140; rem. 318.
 o. 153;
 rem. 4779.
 p. 76; rem. 5240.
 q. 153;
 rem. 3406.
 r. 89; rem. 7169.
 s. 73; rem. 8611.
 t. 104;
 rem. 2411.
 u. 87; rem. 5313.
 v. 58; rem. 2168.
 w. 132;
 rem. 1036.
 x. 133;
 rem. 4712.
 y. 102; rem. 170.
 z. 73; rem. 4929.
Page 134; 16
 1. 153 in.
 2. 46 pt.; 127 pt.
 3. 23 pk.
 4. 23 ft.; 29 ft.;
 41 ft.
 5. 240 in.; 280 in.
 6. 234 gal.;
 222 gal.
 7. 125 yd.;
 123 yd.
 8. 396 oz.
 9. 11,675 lb.
 10. 86,400 sec.;
 313,200 sec.
 11. 744 hr.
 12. 52 pkgs.
 13. 2400 pt.
 14. 1132 steps.
 15. 1475 yd.
 16. 60 cents.
 17. $23\frac{1}{2}$ gal.;
 \$4.19.
 18. 240 rd.
 19. 109 yd. 22 in.
 20. 412 oz.
 21. \$415.68.
Page 138; 20
 4. 9; $\frac{1}{5}$.
 5. 48; $\frac{7}{15}$.
 6. 5; $\frac{1}{15}$.
 7. 21; $\frac{1}{15}$.
 8. 42; $\frac{1}{15}$.
 9. 49; $\frac{1}{5}$.
 10. 72; $\frac{1}{5}$.
 11. 25; $\frac{1}{15}$.
 12. 25; $\frac{2}{15}$.
 13. 52; $\frac{1}{5}$.
 14. 24; $\frac{1}{5}$.
 15. 16; $\frac{1}{15}$.
 16. 9; $\frac{1}{15}$.
 17. 18; $\frac{1}{15}$.
 18. 42; $\frac{1}{5}$.
 19. 21; $\frac{1}{5}$.
 20. $\frac{1}{15}$; $\frac{1}{15}$; $\frac{1}{15}$;
 $\frac{1}{15}$.
 21. $\frac{1}{15}$; $\frac{1}{15}$; $\frac{1}{15}$; $\frac{1}{15}$.
 22. $\frac{1}{5}$; $\frac{1}{5}$.
 23. $\frac{1}{5}$.
 24. $\frac{1}{15}$.
 25. $\frac{1}{15}$.
Page 139; 21
 12. $\frac{1}{15}$.
 13. $\frac{1}{15}$.
 14. $\frac{1}{15}$.
 15. $\frac{1}{15}$.
 16. $\frac{1}{15}$.
 17. $\frac{1}{15}$.
 18. $\frac{1}{15}$.
Page 143; 25
 8. $\frac{1}{5}$.
 9. $\frac{1}{15}$.
 10. $\frac{1}{5}$.
 11. $\frac{1}{15}$.
 12. $\frac{1}{15}$.
 13. $\frac{1}{15}$.
 14. $\frac{1}{15}$.
 15. $\frac{1}{15}$.
 16. $\frac{1}{15}$.

ANSWERS

27

17. $\frac{5}{8}$.
18. $\frac{5}{12}$.
19. $\frac{1}{2}, \frac{1}{3}, \frac{2}{3}$.
20. $\frac{1}{2}, \frac{2}{3}$.
21. $\frac{1}{12}, \frac{1}{6}, \frac{1}{3}, \frac{7}{12}$.
22. 12, 24, 30, 60.
23. 16, 24, 52, 80.
24. 8, 20, 40, 60.

Page 144; 26

1. $\frac{1}{12}, \frac{7}{12}$.
2. $\frac{1}{12}, \frac{3}{8}$.
3. $\frac{2}{3}, \frac{9}{10}$.
4. $\frac{2}{3}, \frac{10}{11}$.
5. $\frac{3}{8}, \frac{1}{2}$.
6. $\frac{5}{8}, \frac{1}{2}$.
7. $\frac{2}{3}, \frac{21}{25}$.
8. $\frac{2}{3}, \frac{6}{11}$.
9. $\frac{7}{12}, \frac{13}{14}$.
10. $\frac{8}{11}, \frac{10}{17}$.
11. $\frac{8}{11}, \frac{6}{7}$.
12. $\frac{11}{12}, \frac{12}{13}$.
13. $15\frac{1}{2}, 15\frac{2}{3}$.
14. $15\frac{1}{2}, 73\frac{1}{2}$.
15. $15\frac{1}{2}, 65\frac{1}{2}$.
16. $51\frac{1}{2}, 24\frac{1}{2}$.
17. $27\frac{1}{2}, 26\frac{2}{3}$.
18. $28\frac{5}{9}, 27\frac{2}{3}$.
19. $56\frac{1}{2}, 25\frac{1}{2}$.
20. $82\frac{1}{2}, 34\frac{1}{2}$.
21. $28\frac{1}{2}, 30\frac{1}{2}$.
22. $49\frac{1}{2}$.
23. $51\frac{1}{2}$.
24. $172\frac{1}{2}$.
25. $309\frac{1}{2}$.
26. $57\frac{1}{2}$.
27. $18\frac{1}{2}$.
28. $57\frac{1}{2}$.
29. $69\frac{1}{2}$.
30. $\frac{2}{3}$.
31. $\frac{1}{3}$.

32. $10\frac{1}{2}$.

33. 6.

34. $\frac{1}{5}$.

35. $1\frac{1}{2}$.

36. $\frac{1}{4}$.

37. $1\frac{1}{2}$.

Page 146; 28

1. $\frac{1}{2}$; \$1.50.
2. $\frac{1}{2}$; 15¢.
3. 30¢.
4. $\frac{1}{2}$, \$16.
5. 4; \$4800.
6. $\frac{1}{5}$; 27.
7. $1\frac{1}{2}$; \$21.
8. $1\frac{1}{2}$; 248.
9. $1\frac{1}{2}$; \$12.
10. \$1200.
11. $\frac{1}{2}$; \$1.20.
12. \$5.00.
13. 6500 ft.

Page 149; 31

5. 48 min.
6. 12 mi.
7. \$24.
8. \$1600.
9. \$2.25;
\$6.75; \$11.25;
\$18.
10. 20.
11. $\frac{1}{2}$.
- 12.
13. $\frac{1}{2}$.
14. \$8000.

Page 152; 34

11. $\frac{6}{7}$.
12. $\frac{1}{8}$.
13. $\frac{1}{8}$.
14. $\frac{1}{8}$.

15. $1\frac{1}{2}$.

16. $1\frac{1}{2}$.

17. $1\frac{1}{2}$.

18. $1\frac{1}{2}$.

19. $\frac{1}{2}$.

20. $\frac{1}{2}$.

141. $328\frac{1}{2}$.

142. $465\frac{1}{2}$.

143. $367\frac{1}{2}$.

144. $490\frac{1}{2}$.

145. $253\frac{1}{2}$.

146. $234\frac{1}{2}$.

147. $272\frac{1}{2}$.

148. $320\frac{1}{2}$.

149. $619\frac{1}{2}$.

150. $152\frac{1}{2}$.

151. $838\frac{1}{2}$.

152. $440\frac{1}{2}$.

153. $554\frac{1}{2}$.

154. $570\frac{1}{2}$.

155. $839\frac{1}{2}$.

156. $339\frac{1}{2}$.

157. $475\frac{1}{2}$.

158. $449\frac{1}{2}$.

159. $658\frac{1}{2}$.

160. $873\frac{1}{2}$.

161. $321\frac{1}{2}$.

162. $463\frac{1}{2}$.

163. $369\frac{1}{2}$.

164. $497\frac{1}{2}$.

165. $262\frac{1}{2}$.

166. $230\frac{1}{2}$.

167. $279\frac{1}{2}$.

168. $337\frac{1}{2}$.

169. $633\frac{1}{2}$.

170. $168\frac{1}{2}$.

171. $877\frac{1}{2}$.

172. $460\frac{1}{2}$.

173. $575\frac{1}{2}$.

174. $538\frac{1}{2}$.

175. $765\frac{1}{2}$.

176. $278\frac{1}{2}$.

177. $410\frac{1}{2}$.

178. $456\frac{1}{2}$.

179. $648\frac{1}{2}$.

180. $912\frac{1}{2}$.

181. $54\frac{1}{2}$.

182. $112\frac{1}{2}$.

183. $165\frac{1}{2}$.

184. $231\frac{1}{2}$.

185. $285\frac{1}{2}$.

186. $360\frac{1}{2}$.

187. $300\frac{1}{2}$.

188. $433\frac{1}{2}$.

189. 650.

190. $791\frac{1}{2}$.

191. $888\frac{1}{2}$.

192. $427\frac{1}{2}$.

193. $221\frac{1}{2}$.

194. $131\frac{1}{2}$.

195. $91\frac{1}{2}$.

196. $30\frac{1}{2}$.

197. $71\frac{1}{2}$.

198. $809\frac{1}{2}$.

199. $464\frac{1}{2}$.

200. $553\frac{1}{2}$.

201. $4\frac{1}{2}$.

202. $2\frac{1}{2}$.

203. $1\frac{1}{2}$.

204. $3\frac{1}{2}$.

205. $2\frac{1}{2}$.

206. $4\frac{1}{2}$.

207. $5\frac{1}{2}$.

208. $5\frac{1}{2}$.

209. $4\frac{1}{2}$.

210. $4\frac{1}{2}$.

211. $4\frac{1}{2}$.

212. $12\frac{1}{2}$.

213. $26\frac{1}{2}$.

214. $22\frac{1}{2}$.

215. $54\frac{1}{2}$.

216. $18\frac{1}{2}$.

217. $11\frac{2}{11}$.
 218. $9\frac{27}{155}$.
 219. $15\frac{11}{155}$.
 220. $5\frac{11}{155}$.
 221. $1\frac{1}{11}$.
 222. $1\frac{1}{11}$.
 223. $\frac{8}{11}$.
 224. $\frac{1}{11}$.
 225. $1\frac{107}{155}$.
 226. $\frac{1}{11}$.
 227. $\frac{1}{11}$.
 228. $\frac{21}{2500}$.
 229. $\frac{1}{11}$.
 230. $\frac{1}{11}$.
 231. $\frac{775}{1155}$.
 232. $\frac{1}{11}$.
 233. $\frac{1}{225}$.
 234. $\frac{8}{225}$.
 235. $1\frac{21}{11}$.
 236. $\frac{21}{11}$.
 237. $5\frac{17}{20}$.
 238. $3\frac{1}{5}$.
 239. $\frac{21}{11}$.
 240. $\frac{1}{11}$.

Page 155 ; 37

1. \$15.798.
 2. \$2.525.
 3. \$11.285.
 4. \$29.97.
 5. \$42.735.
 6. \$16.479.
 7. \$12.14.
 8. \$6.639.
 9. \$1.285.
 10. \$4.072.
 11. \$4.667.
 12. \$5.622.
 13. \$24.221.
 14. \$2.315;
 \$3.615.

15. \$2.014.
 16. \$53.90.
 17. \$59.8.
 18. \$52.445.
 19. \$26.875.
 20. \$16.128.
 21. \$7.20.
 22. \$101.178.
 23. \$572.30.
 24. \$57.23.
 25. \$5.723.

Page 159 ; 41

1. 48.634.
 2. .0254.
 3. 93.182.
 4. 421.109.
 5. 20.194.
 6. 441.735.
 7. 4.2103.
 8. 1.0459.
 9. 20.9713.
 10. 16.6008.
 11. .51563.
 12. 8.995 tons.
 13. 18.525 acres.
 14. 2.647.
 15. .505.
 16. 6.8.
 17. 17.7552.
 18. 5.3076.
 19. 20.6159.
 20. 78.655.
 21. 82.3637.

Page 165 ; 47

2. 9.75.
 3. 408.6.
 4. 241.8.
 5. 3.36.
 6. 8.856.

7. \$31.82.
 8. 37.746.
 9. 69.0346.
 10. 9.3411.
 11. .0115.
 12. .30668.
 13. 1.18296.
 14. 78.125.
 15. .2091.
 16. 2.1912.
 17. .7676.
 18. 3.15.
 19. .533.
 20. \$1350.
 21. \$110.
 22. \$4463.46.
 23. 73.98 A.
 24. \$1893.89.
 25. \$640 gain ;
 \$3840 selling
 price.

Page 166 ; 48

1. $\frac{1}{5}$.
 2. \$0.80.
 3. $1\frac{1}{3}$ in.
 4. $8\frac{1}{2}$ in.
 5. 7 ft. 5 in.
 6. 1289.52 cu. ft.
 7. $\frac{1}{5}$.
 8. $\frac{1}{5}$.
 9. $\frac{1}{5}$.
 10. $\frac{1}{20}$.
 11. $\frac{1}{10}$.
 12. $\frac{1}{15}$.
 13. $\frac{27}{155}$.
 14. $\frac{21}{155}$.
 15. $\frac{1}{5}$.
 16. $\frac{1}{200}$.
 17. $\frac{1}{155}$.
 18. $\frac{21}{155}$.

19. \$103.52.
 20. \$234.57.
 21. 32 acres.
 22. \$79.80.
 23. .21084.
 24. .04592.
 25. .2432.
 26. .00064.
 27. .99004.
 28. .326326.
 29. .04.
 30. .0387.
 31. 3.3136.
 32. .022454.
 33. .000152.
 34. 8.26281.

Page 167 ; 49

1. $\frac{1}{5}$.
 2. 36.75 yd.
 3. 137.915.
 4. 26.842.
 5. 89.423.
 6. 16.686.
 7. 84.285.
 8. .15.
 9. .49.
 10. .582.
 11. .165.
 12. 1.573.
 13. 1.857.
 14. 2.0254.
 15. .9403.
 16. .097.
 17. 1.155.
 18. \$16.417.
 19. \$42.78.
 20. \$28.13.
 21. 375 girls.
 22. \$26.29.
 23. .4383.

Page 169; 51

1. 10.8.
2. 24.
3. 8.2.
4. .07.
5. .24.
6. 80.
7. 5000.
8. .6.
9. 12.
10. 1200.
11. 5000.
12. 25.
13. 1.2.
14. 1.2.
16. 16.625.
17. 51.2.
18. 2.56.
19. 12.
20. .5.
21. 3.6.
22. .06.
23. 35.
24. 4.
25. .20 +.
26. 54.
27. 60.
28. 70.
29. 160.
30. 9.
31. 68.59 T.

Page 170; 52

3. .25.
4. .125.
5. .875.
6. .0833 +.
7. .0625.
8. 12.
9. .35.
10. .4375.

11. .6.
12. .9375.
13. .68.
14. .5625.
15. .76.
16. .53125.
17. .6875.
18. .36.
20. .66 $\frac{2}{3}$.
21. .16 $\frac{2}{3}$.
22. .28 $\frac{1}{3}$.
23. .41 $\frac{2}{3}$.
24. .58 $\frac{1}{3}$.
25. .44 $\frac{2}{3}$.
26. .15 $\frac{1}{3}$.
27. .71 $\frac{2}{3}$.
28. .46 $\frac{2}{3}$.
29. .91 $\frac{2}{3}$.
30. .17 $\frac{1}{3}$.
31. .45 $\frac{2}{3}$.
33. 5.34375.
34. 3.8125.
35. 9.432.
36. 4.95.
37. 13.875.
38. 7.301 $\frac{1}{3}$.
39. 6.48 $\frac{2}{3}$.
40. 17.66 $\frac{2}{3}$.
41. 19.45 $\frac{1}{3}$.
42. 2.1955.

Page 171; 53

1. 6.206.
2. 67.1875 A. or
0.261 + of
the farm.
3. 45.
4. 10.125.
5. $4\frac{1}{2} = \frac{1}{2}$ of $22\frac{1}{2}$.
6. 4.65.
7. 4500 bu.

8. 4800 yd.
9. 5.21 $\frac{1}{4}$.
10. 1.07.
11. \$3.60.
12. 34 T.
13. 160 mi.
14. 24.5 yd.
15. 4000.
16. \$5004.
17. \$57.60.
18. \$1.44.
19. .75.

Page 173; 55

1. \$9.96.
2. \$1206.
3. \$5600.
4. \$46.
5. $\frac{1}{2}$; .02; 20%.
6. \$92.
7. \$210.
8. \$210.
9. \$320.
10. \$410.
11. \$442.
12. \$8.699 +.
13. \$.045.
14. \$.054.
15. \$23; $\frac{2}{100}$; 23%.
16. \$.14.

Page 174; 56

17. \$16.50.
18. 25 $\frac{1}{2}$ yd.
19. 232 pkgs.
20. .0768.
21. \$8.19.
22. \$.78.
23. 43 $\frac{3}{4}$ %.
24. 72 rd. 12 ft.
25. \$40.

26. 77.868 A.
27. .35 $\frac{3}{4}$.
28. .428 $\frac{1}{4}$.
29. 712.882 +.
30. 118.1013.
31. 59.817.

Page 177; 59

2. 782 bu.
3. 5699.4 yd.
4. \$274.80.
5. 97.44 bu.
6. 261.1 T.
7. \$5400.
8. 18,602.
9. \$230.
10. \$1391.52.
11. 1120 sheep.
12. 700 sheep.

Page 178; 60

1. \$3.50.
2. 4900 lb.
3. \$81.
4. 68 T.
5. \$256.50.
6. \$211.20.
7. \$98.
8. \$351.90.
9. \$133.10.
10. 728 sheep.
11. $\frac{1}{5}$, 80%

Page 180; 62

1. 12 $\frac{1}{2}$ %.
2. $\frac{1}{10}$, 10%.
3. 25%.
4. 33 $\frac{1}{3}$ %.
5. 88%.
6. 86 $\frac{2}{3}$ %.
7. 45 $\frac{1}{2}$ %.

9. $5\frac{1}{2}\%$
 10. \$4953.
 11. \$3387.43.
 12. 25%

Page 182; 64

1. $37\frac{1}{2}\% = \frac{3}{8}$ of
 100 %
 2. $16\frac{2}{3}\% = \frac{1}{3}$ of
 100 %
 3. \$108.
 4. \$24.
 5. 1520 acres.
 6. \$2000.
 7. \$54.
 8. 500 bu.
 9. \$120.
 10. \$20.
 11. \$400.
 12. \$128.
 13. $62\frac{1}{2}\% = \frac{5}{8}$ of
 100 %;
 1200 bu.
 14. 384 sheep.
 15. 3.
 $18\% = \frac{3}{5} \times \frac{1}{8}$ of
 100 %;
 1280 bu.

Page 184; 66

1. \$75.60; 67.5
 lb.; 147.6 ft.
 2. 78 T.; 164.16
 mi.; 414 men.
 3. \$767.25.
 4. \$3900.
 5. 1225 bu.
 6. \$700.
 7. 3200.
 8. \$4; 800 ft.
 9. \$150.

10. $12\frac{1}{2}\%$
 11. $\frac{1}{3}$; 20%
 12. 4%
 13. \$17.
 14. \$30.
 15. 12%
 16. \$85.

Page 186; 68

1. \$72.80.
 2. \$255; $14\frac{2}{3}\%$
 3. 75%
 4. 20%
 5. $66\frac{2}{3}\%$
 6. 20%
 7. \$180.
 8. 20%
 9. \$9.375.
 10. 20%
 11. \$150.
 12. \$302.94.
 13. \$38,396.80.
 14. $16\frac{2}{3}\%$
 15. 320 sheep.

Page 187; 69

1. \$448.
 2. 20%
 3. \$8250.
 4. $31\frac{1}{3}\%$
 5. \$4375.
 6. 730 bbl.
 7. 422.3 T.
 8. 239.1 lb.
 9. \$3393.72.
 10. 629.34 mi.
 11. \$3847.185.
 12. 493.8.
 13. 28%
 14. 64%
 15. 23%

16. 38,999 + %
 17. 22%
 18. $8.434 + \%$
 19. 17%
 20. $16\frac{1}{3}\%$
 21. \$1404.
 22. \$5000.
 23. 187.5.
 24. 11.82.
 25. 963.
 26. \$635.
 27. \$1274.
 28. 9876.
 29. \$3125.
 30. 66 gal.

Page 190; 72

2. \$6.30.
 3. \$4.20.
 4. \$2.16.
 5. \$10.13.
 6. \$22.40.
 7. \$36.55.
 8. \$20.40.
 9. \$22.80.

Page 191; 73

3. 4 mo.
 4. \$3; \$153.
 6. \$208.33.
 7. \$15.40.
 8. \$467.95.
 10. \$142.88.
 11. \$229.60.

Page 192; 74

1. 1896; 1904;
 2000.
 3. 2 yr. 4 mo. 5
 da.

4. 2 yr. 2 mo. 3
 da.
 5. 5 yr. 10 da.
 6. 4 yr. 7 mo. 21
 da.
 7. 2 yr. 2 mo. 13
 da.
 8. 6 mo. 9 da.
 9. 1 yr. 6 mo. 12
 da.

Page 193; 75

10. \$45.
 11. \$4.39.
 12. \$25.97.
 13. \$61.71.
 14. \$22.34.
 15. \$730.13.
 16. \$652.80.
 17. \$40.69.
 18. \$71.28.
 19. \$1077.38.

Page 196; 78

3. \$1.59.
 4. \$7.95.
 5. \$2.125.
 6. \$20.64+.
 7. \$3.74+.
 8. \$51.64.
 9. \$1.50+.
 10. \$5.57+.
 11. \$1.04-.
 12. \$2.47+.
 13. \$7.17.
 14. \$2.65.
 15. \$.78+.
 16. \$4.04+.
 17. \$47.23+.
 18. \$10.53.
 19. \$11.85.

20. \$38.84.
21. \$23.08.
22. \$111.28.
23. \$52.01+.

Page 198; 80

2. 106 oz.
3. 47 pt.
4. 48,240 sec.
5. 516 sq. in.
6. 24,860 sec.
7. 64,350 lb.
8. 8768 cu. in.
9. 3 yd. 7 in.
10. 6 yd. 2 ft. 8 in.
11. 1 hr. 31 min.
12. 6 gal. 3 qt.
13. $28\frac{1}{2}$ lb.
14. $6\frac{1}{2}$ sq. ft.

Page 199; 81

2. 16 gal. 2 qt.
3. 38 bu. 1 pk.
4. 22 yd. 10 in.
6. 2 gal. 3 qt.
7. 3 hr. 31 min.
53 sec.
8. 1 yd. 2 ft. 9 in.
13. $7\frac{1}{2}$ in.
14. 30 lb. 6 oz.
15. 27 yd. 1 ft. 10 in.
16. 2 lb. $1\frac{1}{2}$ oz.
17. $11\frac{1}{2}$.

Page 200; 82

1. $\frac{1}{2}$; $\frac{1}{3}$.
2. $\frac{1}{4}$; $\frac{1}{5}$.
4. 5280 ft.
5. 640 rd.; 560 rd.
6. 160 rd.; 80 rd.;
40 rd.

7. $\frac{1}{2}$ mi.; $\frac{1}{4}$ mi.; $\frac{1}{2}$ mi.
8. 50%; 25%.
9. 120 rd.; 200 rd.
10. 560 rd.
11. 1056 ft.; 3960 ft.
12. $\frac{1}{10}$.
13. $\frac{1}{10}$; $\frac{1}{10}$.
14. 198 in.
15. $\frac{1}{10}$ rd.
16. 50%.
17. 63,360 in.;
39,600 in.
18. 71,280 ft. 6 in.
19. 1237 ft. 6 in.

Page 203; 85

18. $13\frac{1}{2}$ sq. ft.
19. 540 sq. in.
20. 24 sq. rd.
21. 43,560 sq. ft.
22. 174,240 sq. ft.
23. 28 sq. rd.
24. $62\frac{1}{2}$ A.
25. 160 sq. rd.

Page 204; 86

1. 3600 sq. ft.
2. \$1200.
3. 96 sq. yd.
4. $\frac{1}{10}$; 10%.
5. 8940 sq. ft.
6. 11,520 shingles.
7. 47 or 48 bundles.
8. \$49.94.
9. $1\frac{3}{4}$ sq. rd.
10. \$63.
11. 1458.
12. 4400.

Page 205; 87

1. 640 A.
2. 160 A.; 2 mi.
3. $\frac{1}{8}$ sec.
4. \$3200.
5. 40 rd. sq. and
10 A.
6. \$288.
7. 45 bu.
8. \$1500.
9. \$16,000.
10. 4 A.
11. 6 A.
12. $50\frac{11}{100}$ A.

Page 206; 88

1. 640 A.;
23,040 A.
2. 160 A.
3. 640 rd.
4. \$3600.
5. $\frac{1}{4}$ sec.; 160 A.
6. $\frac{1}{8}$ sec.
7. $\frac{1}{4}$ mi.; 1 mi.
8. \$720.
9. \$30,720.
10. \$1,386,240
profit.

Page 207; 89

1. 3 ways.
2. Whole area
180 sq. rd.
3. 8×16 ; 128; 48.
4. 12 sq. rd.
5. 3 ways.
7. 74 ft.
9. 269 sq. ft.
10. \$72.63.

Page 210; 92

2. 12.
3. 8 bds.
4. 12 bd. ft.
5. 36 bd. ft.
6. 10 bd. ft.
7. 15 bd. ft.
8. $40\frac{1}{2}$ bd. ft.
9. 25 bd. ft.
10. 72 bd. ft.
11. \$48.
12. \$42.50.
13. \$189.
14. \$48.
15. \$28.50.
16. \$128.
17. \$6.72.

Page 211; 93

3. 528 sq. ft.
4. 528 ft. of L.;
\$10.56.
12. \$4.80.
13. \$53.76.
14. 2400 bd. ft.

Page 214; 96

1. 270 cu. in.
2. 320 cu. in.
3. 960 cu. in.
4. 3 in.
5. $L = \frac{1}{2}$, $A = \frac{1}{2}$,
 $C = \frac{1}{2}$.
8. 96 blocks.
9. 30 cu. ft.
10. 81 cu. ft.
11. 27 cu. ft. 1 cu.
yd.
12. $85\frac{1}{2}$ cu. yd.

Page 215; 97

1. $2\frac{1}{2}$ times as large.
2. 8 times 1 cu. yd.
3. $\frac{3}{4}$ cu. yd.
4. $\frac{1}{4}$.
5. $20\frac{3}{8}$ lb.
6. 64 cu. yd.
7. 252 cu. ft.
8. 57.6 bu.
9. 64 lb.
10. 1728 boxes.
11. 6600 lb.
12. 1089 cu. ft.
13. \$75.
14. 256 bu.
15. $73\frac{1}{2}$ loads.
16. $6060\frac{3}{4}$ cu. ft.

Page 217; 99

1. \$207.90.
2. 228 cu. yd. 4 cu. ft.
3. \$136.89.
4. \$383.04.
5. \$47.84.
7. 416 sq. ft.; \$127.11.
8. 8 ft.
9. 704 sq. ft.
10. 4 ft.
11. $403\frac{1}{2}$ sq. ft.

Page 218; 100

3. \$7.
4. \$24.
5. 5 cd.
6. 3 cd.; \$20.25.
7. \$22.50.
8. \$1.50.

Page 224; 106

13. 62426.
14. \$4036.50.
15. 67.
16. \$197.25.
17. 256.63.
18. All for 544.66.
19. \$123.31.
20. 29,590 $\frac{3}{4}$.
21. .1.

Page 225; 107

1. $82\frac{1}{2}$ lb.
2. $10\frac{1}{2}$ yr.
3. $285\frac{1}{2}$.
4. 2 $\frac{3}{4}$.
5. \$6.77.
6. \$1.70.
7. 6 breadths 8 yd. long cost \$60.
8. 8 breadths cost \$88.
9. 640 rails.
10. \$672.
11. 88 sq. in.
12. \$3379.50.
13. \$2.93.
14. 13,200 ft.
15. 972 sq. in.
16. $77\frac{1}{2}$ rd.
17. 8424 cu. in.
18. 23,836,032 sq. in.

Page 226; 108

1. \$74.57.
2. 1080 gal.

3. \$19.32.

4. 6 yd.
5. \$8.
6. $14\frac{1}{2}$ yd.
7. \$1739.
8. \$3.52.
9. \$40.
10. \$1256.27.
11. \$73.33.
12. \$119.70.
13. \$26.88.
14. $53\frac{1}{2}$ hr.
15. \$420.

Page 227; 109

1. \$4500.
2. (1) 2560 cu. ft.; 94 $\frac{3}{4}$.
3. \$13.74.
- 4.
5. 1008 cu. ft.
6. \$756.
7. \$18.
8. \$81.17.
9. $16\frac{2}{3}\%$.
10. 25%.
11. $33\frac{1}{2}\%$.
12. 32 rd.
13. \$9625.
14. 90 cd.
15. 60 da.; \$97 $\frac{1}{2}$.

Page 228; 110

1. $30\frac{3}{4}$.
2. 0.9.
3. $2\frac{7}{8}$.
4. \$0.34.
5. 200.
6. $37\frac{1}{2}\%$.
7. 240 A.
8. 2560 times.

9. 6048 cu. in.

10. 233 oz.
11. 55 yd. $1\frac{1}{2}$ ft
12. 27 sq. in.
13. \$26.36.
14. \$151.54.
15. \$13.89.
16. \$2.40.
17. \$15.
18. \$136.98.
19. \$0.86.
20. 14 ft.
21. $1\frac{1}{16}$.
22. \$284.06.

Page 229; 111

1. \$16.56.
2. 1120 T.
3. 32.
4. \$10.50.
5. 174.
6. \$11.46.
7. \$68.68.
8. \$63.86.
9. 4 breadths cost \$32.50.
10. \$522.04.

Page 230; 112

1. $15\frac{1}{2}$.
2. $\frac{1}{4}$.
3. \$300.
4. \$13.13.
5. $\left\{ \begin{array}{l} \text{length } 1:2. \\ \text{area } 1:4. \\ \text{vol. } 1:8. \end{array} \right.$
6. \$2400 cost; \$2200 selling price.
7. \$155.31.
8. $91\frac{1}{2}\%$.

9. \$3.98.
10. \$28.33.
11. \$251.20.
12. \$2.50 per day.
13. $2\frac{1}{4}$ ft.
14. \$19.90.

Page 231; 113

1. \$243.19.
2. \$5.25.
3. 21 mattresses;
\$1.25 left.
4. 285 lb.
5. $141\frac{1}{8}$.
6. 9150 cu. ft.
7. \$42.70.
8. \$16.38.
9. \$30.70.

10. \$14.63.
11. \$3 per ton.
12. \$135.
13. 7.7 in.
14. \$228.

Page 232; 114

1. \$37.125.
2. \$28.6875.
3. \$859.
4. $\frac{3}{4}$.
5. $\frac{1}{17}$.
6. $13\frac{7}{8}$.
7. \$10 gain.
8. \$172.94.
9. \$4.13 gain.
10. $6\frac{1}{4}\%$.
11. \$169.47.

12. 7.138 ft.
- 13.
14. \$20.63.
15. 320.

Page 233; 115

1. $\frac{1}{4}$ or $16\frac{1}{4}\%$.
2. \$83.58.
3. 893.02 gal.
4. \$684.68.
5. \$90.63.
6. 3780 sq. ft.
7. \$840.
8. \$200.
9. \$354.66.
10. \$99.99.
11. .0016275.
12. 2 in. wide.

13. \$43.6525.
14. \$3.50.
15. 61.700 cu. ft.
16. \$665.76.

Page 234; 116

1. \$480.
2. \$2.69.
3. 118 sq. rd.
4. \$1.52.
5. 38.09 days.
6. \$8.60.
7. \$48.75.
8. 40%.
9. 16 tons.
10. 50%.
11. \$532.08.
12. \$0.03 $\frac{1}{4}$.

ANSWERS

BOOK III, PART I (3-vol. ed.)

BOOK II, CHAP. II (2-vol. ed.)

NOTE.—The first page-number refers to the 3-vol. ed.; the second, to the 2-vol. ed

Page 9; 125	12. \$5536.50.	Page 21; 137	34. \$34,320.75.
1. \$45.40.	13. \$4245.66.	3. 453,456.	35. \$12,652.12.
2. \$300.49.	14. \$7090.68.	4. 2,373,672.	36. \$1769.93.
3. \$3815.24.	15. \$1554.18.	5. 15,984 ¢.	37. \$141.00.
4. \$35,751.37.	16. \$1290.84.	6. 35,441 lbs.	38. \$230.55.
5. \$48,590.80.		7. 114,163.	39. \$4676.25.
6. \$11,465.13.	Page 14; 130	8. 62,464 oz.	40. \$832.48.
7. \$13,729.55.	1. \$473.23.	9. \$583,737.	41. \$174.06.
8. \$15,850.62.	2. \$140.53.	10. 16,308 doz.	42. 17,280,000 rds.
9. \$16,197.45.	3. \$309.52.	11. \$38,880.	43. 134,928 sq. in.
10. \$14,581.69.	4. \$127.73 loss.	12. \$3096.	44. 1,555,200 sec.
11. \$16,878.86.	5. 256,506.	13. 8064 qts.	
12. \$88,503.30.	6. 860,767.	14. 6574 ¢.	Page 22; 138
13. \$88,503.30.	7. 850 ft.	15. 729,022.	7. \$6471.36.
15. \$3889.44.	8. \$620,581,818.	16. 4214 oz.	8. \$19,849.83.
16. \$4480.80.	9. \$476,500,561.	17. 29,488 posts.	9. 973,000.
17. \$4609.18.	10. \$657,805,399.	18. \$15,584.73.	4. \$316.80.
18. \$4438.55.	11. \$524,955,950.	19. \$226,645.44.	5. \$335.
19. \$4435.58.	12. \$664,426,346.	20. \$62,652.55.	6. \$1850.
		21. \$1484.28.	
Page 12; 128	Page 16; 132	22. \$8741.25.	Page 26; 142
1. \$16,654.13.	1. \$13.44.	23. \$44,846.50.	9. \$67.00.
2. \$4881.11.	2. \$500.78.	24. \$1985.75.	10. \$90,817.
3. \$4194.20.	3. \$8458.25.	25. \$4984.00.	11. \$82.
4. \$7198.54.	4. \$15,999.60.	26. \$3431.25.	12. \$825.50.
5. \$12,726.65.	5. \$7156.52.	27. \$3831.36.	13. \$74 $\frac{1}{5}$.
6. \$15,138.25.	6. \$561.91.	28. \$2277.45.	14. 843 $\frac{1}{2}$.
7. \$6668.01.	7. \$44.21.	29. \$8936.28.	15. 80 $\frac{1}{2}$.
8. \$3960.21.	8. \$6368.13.	30. \$6208.61.	16. 247 $\frac{1}{2}$.
9. \$9668.11.	9. \$778.71.	31. \$9660.	17. \$2.57 $\frac{1}{2}$.
10. \$14,113.23.	10. \$541.90.	32. \$14,456.25.	18. 9736 $\frac{1}{2}$.
11. \$2845.02.	11. \$4441.18.	33. \$2259.84.	

19. $13,016\frac{2}{3}$.
20. $3199\frac{4}{7}$.
21. $993\frac{2}{3}$.
22. $2872\frac{2}{3}$.
23. $3071\frac{2}{7}$.
24. $2763\frac{4}{7}$.
25. $2286\frac{2}{3}$.
26. $2904\frac{1}{3}$.
27. $2023\frac{7}{9}$.
28. $1899\frac{2}{3}$.
29. $4026\frac{2}{3}$.
30. $5751\frac{2}{3}$.
31. $2915\frac{2}{3}$.
32. $1957\frac{1}{4}$.
33. $3015\frac{1}{4}$.
34. $1337\frac{2}{8}$.
35. $1934\frac{1}{2}$.
36. $3004\frac{1}{4}$.
37. $3207\frac{1}{2}$.
38. $2955\frac{1}{4}$.

- a. 1483 ; 244.
- b. 1232 ; 244.
- c. 1411 ; 70.
- d. 560 ; 209.
- e. 991 ; 350.
- f. 719 ; 32.
- g. 810 ; 754.
- h. 563 ; 50.
- i. 2148 ; 258.
- j. 508 ; 808.
- k. 434 ; 424.
- l. 873 ; 872.
- m. 701 ; 900.
- n. 1346 ; 190.
- o. 1130 ; 125.
- p. 1210 ; 288.
- q. 1435 ; 238.
- r. 2258 ; 368.
- s. 1358 ; 354.
- t. 417 ; 32.

- u. 2304 ; 159.
- v. 360 ; 924.
- w. 2477 ; 356.
- x. 307 ; 262.
- y. 939 ; 802.
- z. 286 ; 840.

Page 31 ; 147

2. $56\frac{1}{2}$.
3. \$350 gain.
4. \$525.
5. 20 bbl.
6. \$0.75.
7. 2.10.
8. \$402.

Page 32 ; 148

1. \$130 gain.
2. \$5750.
3. 8 hrs.
4. 225 da.
5. \$52.50.
6. 28 mi.
7. \$15,000 ;
\$2500.
8. \$15.75 gain.
9. Post. ; 3¢.
10. 22 qt.
11. 39.

Page 33 ; 149

16. 2640.
17. 17,741.
18. 15,924.
19. 15,522.
20. 1,206,060.
21. 32,616.
22. 3690.
23. 11,466 ft.
24. 10,710 lb.

Page 34 ; 150

1. $63.88 +$ mi.
per hr.
2. 68 T.
3. 18¢.
4. \$2.25.
5. \$2.25.
6. $3\frac{1}{4}$ ¢.
7. 160,000 g.
8. \$63.39.
9. \$996 gain.
10. \$2.60.

Page 36 ; 152

2. \$22.50.
4. \$93.50.
6. \$432.
7. $\frac{1}{2}$ as long.
8. 6 da.
9. \$1225.
10. 1625.
11. 2052.
12. \$1.50.
13. Hans.
14. \$4.
15. 336 mi. ;
84 mi.
16. \$56.25.

Page 37 ; 153

1. 78 hr.
2. 1123 min.
3. 305 in.
4. 2699 sq. in.
5. 232 cu. ft.
6. 43 pt.
7. 1200 rd.
8. 224 qt.
9. 467 hr.
10. 1560 sq. rd.
11. 147 oz.

12. 27,600 lb.
13. 296 qt.
14. 420 mi.
15. 588 min.
16. 15,387 cu. in.
17. 89 gal.
18. $9\frac{1}{2}$ lb.
19. $650\frac{1}{2}$ cu. yd.
20. $9\frac{1}{2}$ hr.
21. $6\frac{2}{3}$ yr.
22. $61\frac{1}{2}$ bu.
23. $128\frac{1}{2}$ cu. yd.
24. 108 gal. 6 gi.
25. 83 $\frac{1}{2}$ da.
26. 26,000.
27. 5824.
28. $60\frac{2}{3}$ cu. ft.
29. 40 lots.
30. 7040.
31. 2666 $\frac{1}{2}$.
32. 2400.

Page 40 ; 156

1. \$15.40.
2. \$2.31.
3. 366 ; 52 wk. ;
2 da.
4. No profit.
5. \$28.67.
6. 100 bbl.
7. \$153.48.
8. 4 wk.
9. \$426.40.
10. \$10,590.
11. 7920.
12. 416 $\frac{1}{2}$.
13. 92,795,826.

Page 42 ; 158

1. $3\frac{1}{2}$.
2. $37\frac{1}{2}$.

3. $5\frac{1}{2}$.

4. $45\frac{1}{2}$.

5. $10\frac{3}{4}$.

6. $416\frac{1}{2}$.

7. $40\frac{1}{2}$.

8. $\frac{1}{10}$.

9. $4\frac{1}{2}$.

10. $20\frac{1}{10}$.

11. $86\frac{1}{2}$ gal.

12. 2363 eggs.

13. 5182.

14. $1\frac{1}{2}$.

15. 4.

Page 48; 164

3. 4620.

4. 1800.

5. 315.

6. 432.

7. 400.

Page 49; 165

2. $\frac{1}{2}$.

3. $1\frac{1}{2}$.

4. $\frac{1}{2}$.

5. $1\frac{1}{2}$.

6. $1\frac{1}{2}$.

7. $1\frac{1}{2}$.

8. $2\frac{1}{2}$.

9. $1\frac{1}{2}$.

10. $\frac{1}{2}$.

11. $1\frac{1}{2}$.

12. $154\frac{1}{2}$.

13. $133\frac{1}{2}$.

14. $58\frac{1}{2}$.

15. $75\frac{1}{2}$.

16. $56\frac{1}{2}$.

17. $13\frac{1}{2}$.

18. $7\frac{1}{2}$.

19. $7\frac{1}{2}$.

20. $56\frac{1}{2}$.

21. $57\frac{1}{2}$.

22. $68\frac{1}{2}$.

23. $79\frac{1}{2}$.

24. $43\frac{1}{2}$.

25. 166.

Page 51; 167

19. \$160.78.

20. \$2.81.

21. \$173.96.

22. \$201.

23. \$33.91.

24. \$32.73.

25. \$66.67.

26. \$43.59.

Page 52; 168

2. $\frac{1}{10}$.

3. \$20.25.

4. 68.

5. $1\frac{1}{2}$ cd.

6. $\frac{1}{10}$.

7. $\frac{1}{2}$; $1\frac{1}{2}$ A.

8. $\frac{1}{2}$.

9. \$15.

10. 6 yd.; \$0.52.

11. \$2.67.

12. \$149.50.

13. $49\frac{1}{2}$.

Page 53; 169

14. $\frac{1}{2}$.

15. $\frac{1}{2}$.

16. $\frac{1}{2}$.

17. $\frac{1}{2}$.

18. $\frac{1}{2}$.

19. $\frac{1}{2}$.

20. $\frac{1}{2}$.

21. $\frac{1}{2}$.

22. $\frac{1}{2}$.

23. $\frac{1}{2}$.

24. $\frac{1}{2}$.

25. $\frac{1}{2}$.

26. $\frac{1}{2}$.

27. $\frac{1}{2}$.

28. $\frac{1}{2}$.

29. $\frac{1}{2}$.

30. $\frac{1}{2}$.

30. $\frac{1}{2}$.

31. $7\frac{1}{2}$.

32. $\frac{1}{2}$.

33. $\frac{1}{2}$.

34. $\frac{1}{2}$.

35. $\frac{1}{2}$.

Page 54; 170

1. \$29.39.

2. \$16.76.

3. \$69.65.

4. \$3.63.

5. $\frac{1}{2}$.

6. \$0.43.

7. \$0.13.

8. \$38.99.

9. \$0.0864.

Page 57; 173

1. $3\frac{1}{2}$.

2. $1\frac{1}{2}$.

3. $1\frac{1}{2}$.

4. $1\frac{1}{2}$.

5. $1\frac{1}{2}$.

6. $1\frac{1}{2}$.

7. $1\frac{1}{2}$.

8. $2\frac{1}{2}$.

9. 15.

10. $1\frac{1}{2}$.

11. $\frac{1}{2}$.

12. $\frac{1}{2}$.

13. $\frac{1}{2}$.

14. $\frac{1}{2}$.

15. $2\frac{1}{2}$.

16. $434\frac{1}{2}$.

17. $610\frac{1}{2}$.

18. $1023\frac{1}{2}$.

19. $70\frac{1}{2}$.

20. $294\frac{1}{2}$.

21. $66\frac{1}{2}$.

22. $11\frac{1}{2}$.

23. $15\frac{1}{2}$.

24. $21\frac{1}{2}$.

25. $1\frac{1}{2}$.

26. $1\frac{1}{2}$.

27. $1\frac{1}{2}$.

28. $1\frac{1}{2}$.

29. $1\frac{1}{2}$.

30. $1\frac{1}{2}$.

31. $1\frac{1}{2}$.

32. $1\frac{1}{2}$.

33. $1\frac{1}{2}$.

34. $1\frac{1}{2}$.

35. $1\frac{1}{2}$.

11. $44\frac{1}{2}$.

12. $32\frac{1}{2}$.

13. $11\frac{1}{2}$ lb.

14. $16\frac{1}{2}$ ft.

Page 58; 174

1. (1) $1\frac{1}{2}$.

(2) $1\frac{1}{2}$.

(3) $1\frac{1}{2}$.

(4) $1\frac{1}{2}$.

(5) $1\frac{1}{2}$.

(6) $1\frac{1}{2}$.

(7) $1\frac{1}{2}$.

(8) $1\frac{1}{2}$.

(9) $1\frac{1}{2}$.

(10) $1\frac{1}{2}$.

2. (1) $1\frac{1}{2}$.

(2) $1\frac{1}{2}$.

(3) $1\frac{1}{2}$.

(4) $1\frac{1}{2}$.

(5) $1\frac{1}{2}$.

(6) $1\frac{1}{2}$.

(7) $1\frac{1}{2}$.

(8) $1\frac{1}{2}$.

(9) $1\frac{1}{2}$.

(10) $1\frac{1}{2}$.

3. (1) $1\frac{1}{2}$.

(2) $1\frac{1}{2}$.

(3) $1\frac{1}{2}$.

(4) $1\frac{1}{2}$.

(5) $1\frac{1}{2}$.

(6) $1\frac{1}{2}$.

(7) $1\frac{1}{2}$.

(8) $1\frac{1}{2}$.

(9) $1\frac{1}{2}$.

(10) $1\frac{1}{2}$.

4. (1) $1\frac{1}{2}$.

(2) $1\frac{1}{2}$.

- | | | | |
|-------------------------|----------------------------|--------------------------|----------------------------|
| (3) $1\frac{1}{2}$. | 8. (1) $22\frac{2}{5}$. | (9) $9\frac{1}{2}$. | (7) $5\frac{1}{2}$. |
| (4) $1\frac{1}{10}$. | (2) $46\frac{1}{5}$. | (10) $16\frac{1}{10}$. | (8) $2\frac{1}{10}$. |
| (5) $\frac{3}{4}$. | (3) $30\frac{1}{2}$. | | (9) $8\frac{1}{2}$. |
| (6) $1\frac{1}{10}$. | (4) $74\frac{1}{2}$. | 12. (1) $\frac{2}{3}$. | (10) $16\frac{1}{2}$. |
| (7) $1\frac{3}{5}$. | (5) $101\frac{1}{2}$. | (2) $12\frac{1}{2}$. | |
| (8) $1\frac{2}{5}$. | (6) $112\frac{1}{2}$. | (3) $3\frac{1}{2}$. | 16. (1) $9\frac{1}{2}$. |
| (9) $1\frac{1}{2}$. | (7) $26\frac{1}{2}$. | (4) $4\frac{1}{2}$. | (2) $10\frac{1}{2}$. |
| (10) $\frac{4}{5}$. | (8) $84\frac{1}{2}$. | (5) $9\frac{1}{2}$. | (3) $12\frac{1}{2}$. |
| | (9) $55\frac{1}{2}$. | (6) $16\frac{1}{2}$. | (4) $53\frac{1}{2}$. |
| | (10) $46\frac{1}{2}$. | (7) $4\frac{1}{2}$. | (5) $70\frac{1}{2}$. |
| 5. (1) $1\frac{1}{2}$. | | (8) $6\frac{1}{2}$. | (6) $69\frac{1}{2}$. |
| (2) $\frac{3}{4}$. | 9. (1) $24\frac{2}{5}$. | (9) $12\frac{1}{2}$. | (7) $6\frac{1}{2}$. |
| (3) $1\frac{1}{2}$. | (2) $54\frac{1}{2}$. | (10) $15\frac{1}{2}$. | (8) $59\frac{1}{2}$. |
| (4) $\frac{1}{2}$. | (3) $35\frac{1}{2}$. | | (9) $17\frac{1}{2}$. |
| (5) $\frac{1}{2}$. | (4) $81\frac{1}{2}$. | 13. (1) $\frac{1}{2}$. | (10) $4\frac{1}{2}$. |
| (6) $\frac{1}{2}$. | (5) $111\frac{1}{2}$. | (2) $\frac{1}{2}$. | |
| (7) $1\frac{1}{2}$. | (6) $121\frac{1}{2}$. | (3) $\frac{1}{2}$. | 17. (1) $79\frac{1}{2}$. |
| (8) $1\frac{1}{2}$. | (7) $31\frac{1}{2}$. | (4) $\frac{1}{2}$. | (2) $66\frac{1}{2}$. |
| (9) $\frac{1}{2}$. | (8) $94\frac{1}{2}$. | (5) $\frac{1}{2}$. | (3) $73\frac{1}{2}$. |
| (10) $\frac{1}{2}$. | (9) $65\frac{1}{2}$. | (6) $\frac{1}{2}$. | (4) $30\frac{1}{2}$. |
| | (10) $50\frac{1}{2}$. | (7) $\frac{1}{2}$. | (5) $9\frac{1}{2}$. |
| 6. (1) $2\frac{1}{2}$. | | (8) $\frac{1}{2}$. | (6) $3\frac{1}{2}$. |
| (2) $1\frac{1}{2}$. | 10. (1) $341\frac{1}{2}$. | (9) $\frac{1}{2}$. | (7) $78\frac{1}{2}$. |
| (3) $1\frac{1}{2}$. | (2) $547\frac{1}{2}$. | (10) $\frac{1}{2}$. | (8) $22\frac{1}{2}$. |
| (4) $1\frac{1}{2}$. | (3) $877\frac{1}{2}$. | | (9) $58\frac{1}{2}$. |
| (5) $1\frac{1}{2}$. | (4) $909\frac{1}{2}$. | 14. (1) $\frac{1}{2}$. | (10) $69\frac{1}{2}$. |
| (6) $1\frac{1}{2}$. | (5) $1048\frac{1}{2}$. | (2) $\frac{1}{2}$. | |
| (7) $1\frac{1}{2}$. | (6) $1585\frac{1}{2}$. | (3) $\frac{1}{2}$. | 18. (1) $300\frac{1}{2}$. |
| (8) $1\frac{1}{2}$. | (7) $2556\frac{1}{2}$. | (4) $\frac{1}{2}$. | (2) $465\frac{1}{2}$. |
| (9) $1\frac{1}{2}$. | (8) $4863\frac{1}{2}$. | (5) $\frac{1}{2}$. | (3) $620\frac{1}{2}$. |
| (10) $1\frac{1}{2}$. | (9) $8527\frac{1}{2}$. | (6) $\frac{1}{2}$. | (4) $763\frac{1}{2}$. |
| | (10) $7601\frac{1}{2}$. | (7) $\frac{1}{2}$. | (5) $851\frac{1}{2}$. |
| 7. (1) $8\frac{1}{2}$. | | (8) $\frac{1}{2}$. | (6) $1373\frac{1}{2}$. |
| (2) $25\frac{1}{2}$. | 11. (1) $17\frac{1}{2}$. | (9) $\frac{1}{2}$. | (7) $2508\frac{1}{2}$. |
| (3) $14\frac{1}{2}$. | (2) $12\frac{1}{2}$. | (10) $\frac{1}{2}$. | (8) $4697\frac{1}{2}$. |
| (4) $17\frac{1}{2}$. | (3) $14\frac{1}{2}$. | | (9) $8424\frac{1}{2}$. |
| (5) $25\frac{1}{2}$. | (4) $13\frac{1}{2}$. | 15. (1) $3\frac{1}{2}$. | (10) $7524\frac{1}{2}$. |
| (6) $30\frac{1}{2}$. | (5) $10\frac{1}{2}$. | (2) $10\frac{1}{2}$. | |
| (7) $14\frac{1}{2}$. | (6) $11\frac{1}{2}$. | (3) $3\frac{1}{2}$. | 19. (1) $14\frac{1}{2}$. |
| (8) $22\frac{1}{2}$. | (7) $15\frac{1}{2}$. | (4) $3\frac{1}{2}$. | (2) $27\frac{1}{2}$. |
| (9) $28\frac{1}{2}$. | (8) $10\frac{1}{2}$. | (5) $5\frac{1}{2}$. | (3) $20\frac{1}{2}$. |
| (10) $24\frac{1}{2}$. | | (6) $12\frac{1}{2}$. | (4) $63\frac{1}{2}$. |
| | | | (5) $85\frac{1}{2}$. |

- (6) $90\frac{1}{15}$.
 (7) $16\frac{7}{10}$.
 (8) $71\frac{3}{8}$.
 (9) $38\frac{1}{105}$.
 (10) $25\frac{3}{12}$.
20. (1) $61\frac{1}{11}$.
 (2) $2\frac{7}{15}$.
 (3) $61\frac{1}{11}$.
 (4) $47\frac{4}{5}$.
 (5) $60\frac{1}{12}$.
 (6) $60\frac{2}{10}$.
 (7) $11\frac{1}{12}$.
 (8) $50\frac{1}{10}$.
 (9) $7\frac{1}{12}$.
 (10) $24\frac{1}{12}$.
21. (1) $3\frac{1}{2}$.
 (2) $3\frac{1}{2}$.
 (3) $4\frac{1}{2}$.
 (4) $4\frac{1}{2}$.
 (5) 4.
 (6) $4\frac{1}{2}$.
 (7) $3\frac{1}{2}$.
 (8) $4\frac{7}{12}$.
 (9) $3\frac{1}{2}$.
 (10) $2\frac{1}{2}$.
22. (1) $6\frac{1}{2}$.
 (2) $3\frac{1}{2}$.
 (3) $7\frac{1}{2}$.
 (4) $1\frac{1}{2}$.
 (5) $2\frac{1}{25}$.
 (6) $3\frac{1}{2}$.
 (7) $4\frac{1}{25}$.
 (8) $2\frac{1}{2}$.
 (9) 4.
 (10) $4\frac{1}{2}$.
23. (1) $15\frac{5}{8}$.
 (2) $56\frac{3}{8}$.
- (3) $64\frac{1}{2}$.
 (4) $256\frac{1}{2}$.
 (5) $428\frac{1}{2}$.
 (6) $545\frac{1}{2}$.
 (7) $115\frac{1}{2}$.
 (8) 578.
 (9) $330\frac{1}{2}$.
 (10) 258.
24. (1) $1\frac{1}{2}$.
 (2) $\frac{1}{2}$.
 (3) $\frac{1}{2}$.
 (4) $\frac{1}{2}$.
 (5) $\frac{1}{2}$.
 (6) $\frac{1}{2}$.
 (7) $\frac{1}{2}$.
 (8) $\frac{1}{2}$.
 (9) $\frac{1}{2}$.
 (10) $\frac{1}{2}$.
25. (1) $\frac{5}{10}$.
 (2) $\frac{1}{2}$.
 (3) $\frac{1}{2}$.
 (4) $\frac{1}{2}$.
 (5) $\frac{1}{2}$.
 (6) $\frac{1}{2}$.
 (7) $\frac{1}{2}$.
 (8) $\frac{1}{2}$.
 (9) $\frac{1}{2}$.
 (10) $\frac{1}{2}$.
26. (1) $\frac{5}{10}$.
 (2) $\frac{1}{2}$.
 (3) $\frac{1}{2}$.
 (4) $\frac{1}{2}$.
 (5) $\frac{1}{2}$.
 (6) $\frac{1}{2}$.
 (7) $\frac{1}{2}$.
 (8) $\frac{1}{2}$.
 (9) $\frac{1}{2}$.
 (10) $\frac{1}{2}$.
27. (1) $1\frac{1}{10}$.
 (2) $\frac{1}{2}$.
 (3) $1\frac{1}{2}$.
 (4) $\frac{1}{2}$.
 (5) $\frac{1}{2}$.
 (6) $\frac{1}{2}$.
 (7) $\frac{1}{2}$.
 (8) $\frac{1}{2}$.
 (9) $\frac{1}{2}$.
 (10) $\frac{1}{2}$.
28. (1) $100\frac{1}{2}$.
 (2) $515\frac{1}{2}$.
 (3) $194\frac{1}{2}$.
 (4) $661\frac{1}{2}$.
 (5) $1343\frac{1}{2}$.
 (6) $1984\frac{1}{2}$.
 (7) $162\frac{1}{2}$.
 (8) $886\frac{1}{2}$.
 (9) $688\frac{1}{2}$.
 (10) $540\frac{1}{2}$.
29. (1) $21205\frac{1}{2}$.
 (2) $33075\frac{1}{2}$.
 (3) $42997\frac{1}{2}$.
 (4) $55462\frac{1}{2}$.
 (5) $62770\frac{1}{2}$.
 (6) $98099\frac{1}{2}$.
 (7) $169,181\frac{7}{10}$.
 (8) $319,548\frac{1}{2}$.
 (9) $566,915\frac{1}{2}$.
 (10) $505,896\frac{1}{2}$.
30. (1) \$ 1583 $\frac{1}{2}$.
 (2) 7083 $\frac{1}{2}$.
 (3) 10687 $\frac{1}{2}$.
 (4) 36992.
 (5) 51450.
 (6) 58176.
 (7) 11880.
 (8) 57800.
- (9) $35245\frac{1}{2}$.
 (10) 25800.
31. (1) $\frac{1}{2}$.
 (2) $\frac{1}{2}$.
 (3) $\frac{1}{2}$.
 (4) $\frac{1}{2}$.
 (5) $\frac{1}{2}$.
 (6) $\frac{1}{2}$.
 (7) $\frac{1}{2}$.
 (8) $\frac{1}{2}$.
 (9) $\frac{1}{2}$.
 (10) $\frac{1}{2}$.
32. (1) $1\frac{1}{2}$.
 (2) 7.
 (3) $4\frac{1}{2}$.
 (4) 30.
 (5) $29\frac{1}{2}$.
 (6) 20.
 (7) $19\frac{1}{2}$.
 (8) $42\frac{1}{2}$.
 (9) 27.
 (10) $26\frac{1}{2}$.
33. (1) $1\frac{1}{2}$.
 (2) $2\frac{1}{2}$.
 (3) $1\frac{1}{2}$.
 (4) $6\frac{1}{2}$.
 (5) $4\frac{1}{2}$.
 (6) $2\frac{1}{2}$.
 (7) $1\frac{1}{2}$.
 (8) $4\frac{1}{2}$.
 (9) $2\frac{1}{2}$.
 (10) $1\frac{1}{2}$.
34. (1) $2\frac{1}{2}$.
 (2) $20\frac{1}{2}$.
 (3) $11\frac{1}{2}$.
 (4) $23\frac{1}{2}$.
 (5) 46.
 (6) $24\frac{1}{2}$.
 (7) $14\frac{1}{2}$.

- (8) $35\frac{1}{2}$.
(9) 152.
(10) $10\frac{7}{8}$.

35. (1) $2\frac{4}{10}$.
(2) $2\frac{4}{15}$.
(3) $1\frac{1}{2}$.
(4) $1\frac{1}{3}$.
(5) $1\frac{1}{4}$.
(6) $2\frac{2}{3}$.
(7) $2\frac{1}{2}$.
(8) $1\frac{1}{2}$.
(9) $1\frac{1}{3}$.
(10) $5\frac{1}{2}$.

36. (1) $2\frac{7}{8}$.
(2) $1\frac{1}{2}$.
(3) $2\frac{1}{2}$.
(4) $6\frac{1}{2}$.
(5) $5\frac{1}{2}$.
(6) $4\frac{1}{2}$.
(7) $1\frac{1}{2}$.
(8) $5\frac{1}{2}$.
(9) $1\frac{1}{2}$.
(10) $1\frac{1}{2}$.

37. (1) $35\frac{1}{2}$.
(2) $54\frac{1}{2}$.
(3) $71\frac{1}{2}$.
(4) $91\frac{1}{2}$.
(5) $104\frac{1}{2}$.
(6) $162\frac{1}{2}$.
(7) $280\frac{1}{2}$.
(8) $529\frac{1}{2}$.
(9) $940\frac{1}{2}$.
(10) $838\frac{1}{2}$.

38. (1) $4\frac{1}{2}$.
(2) $6\frac{1}{2}$.
(3) $8\frac{1}{2}$.
(4) $11\frac{1}{2}$.
(5) $12\frac{1}{2}$.

- (6) $19\frac{1}{2}$.
(7) $33\frac{1}{2}$.
(8) $63\frac{1}{2}$.
(9) $112\frac{1}{2}$.
(10) $100\frac{1}{2}$.

39. (1) $\$38\frac{1}{2}$.
(2) $\$32\frac{1}{2}$.
(3) $\$94\frac{1}{2}$.
(4) $\$84\frac{1}{2}$.
(5) $\$60\frac{1}{2}$.
(6) $\$72\frac{1}{2}$.
(7) $\$152\frac{1}{2}$.
(8) $\$80\frac{1}{2}$.
(9) $\$94\frac{1}{2}$.
(10) $\$253\frac{1}{2}$.

40. (1) $\$6\frac{1}{2}$.
(2) $\$8\frac{1}{2}$.
(3) $\$23\frac{1}{2}$.
(4) $\$8\frac{1}{2}$.
(5) $\$6\frac{1}{2}$.
(6) $\$7\frac{1}{2}$.
(7) $\$43\frac{1}{2}$.
(8) $\$11\frac{1}{2}$.
(9) $\$26\frac{1}{2}$.
(10) $\$38\frac{1}{2}$.

41. (1) $\frac{5}{2}$.
(2) $\frac{1}{2}$.
(3) $1\frac{1}{2}$.
(4) $\frac{1}{2}$.
(5) $1\frac{1}{2}$.
(6) $1\frac{1}{2}$.
(7) $\frac{1}{2}$.
(8) $\frac{1}{2}$.
(9) $1\frac{1}{2}$.
(10) $\frac{1}{2}$.

42. (1) $6\frac{1}{2}$.
(2) $2\frac{1}{2}$.

- (3) $6\frac{1}{2}$.
(4) $47\frac{1}{2}$.
(5) $60\frac{1}{2}$.
(6) $60\frac{1}{2}$.
(7) $1\frac{1}{2}$.
(8) $50\frac{1}{2}$.
(9) $7\frac{1}{2}$.
(10) $1\frac{1}{2}$.

43. (1) $1\frac{1}{2}$.
(2) $1\frac{1}{2}$.
(3) $1\frac{1}{2}$.
(4) $1\frac{1}{2}$.
(5) $1\frac{1}{2}$.
(6) $1\frac{1}{2}$.
(7) $1\frac{1}{2}$.
(8) $1\frac{1}{2}$.
(9) $1\frac{1}{2}$.
(10) $2\frac{1}{2}$.

44. (1) $38\frac{1}{2}$.
(2) $67\frac{1}{2}$.
(3) $36\frac{1}{2}$.
(4) $96\frac{1}{2}$.
(5) $136\frac{1}{2}$.
(6) $223\frac{1}{2}$.
(7) $34\frac{1}{2}$.
(8) $88\frac{1}{2}$.
(9) $67\frac{1}{2}$.
(10) $136\frac{1}{2}$.

45. (1) $1\frac{1}{2}$.
(2) $1\frac{1}{2}$.
(3) $1\frac{1}{2}$.
(4) $4\frac{1}{2}$.
(5) $2\frac{1}{2}$.
(6) $1\frac{1}{2}$.
(7) $1\frac{1}{2}$.
(8) $3\frac{1}{2}$.
(9) $1\frac{1}{2}$.
(10) $1\frac{1}{2}$.

Page 59; 175

1. $\frac{1}{2}$.
2. $\$52.31$.
3. $\$391$.
4. $\$445$.
5. $\$0.165+$.
6. $\$4.50$.
7. $\$375$.
8. $\$6.00$.
9. $\$19.01$.
10. $3\frac{1}{2}$ mi.
11. 160 mi.
12. $127\frac{1}{2}$.
13. $14\frac{1}{2}$ mi.

Page 60; 176

1. $\frac{1}{2}$.
2. 59.
3. $95\frac{1}{2}$ A.
4. 10 bbl.
5. 3190.
6. $1\frac{1}{2}$.
7. 9.32.
8. 135; $\$19,125$.
9. $\$32.56$.
10. 50 yd.
11. $6\frac{1}{2}$.

Page 66; 182

1. $\$9364.88$.
2. $1\frac{1}{2}$.
3. 10,235 steps.
4. 1440.
5. $3\frac{1}{2}$.
6. $\frac{1}{2}$.
8. Mar. 14.
- May 1st.
9. $1\frac{1}{2}$.
10. 179.
11. $\$1106\frac{1}{2}$.
12. $37\frac{1}{2}$; 26; 29.

Page 68; 184

1. \$632.76.
2. \$533.80.
3. \$21.46.
4. \$25.66.
5. \$39.36.
6. \$30,700.

Page 69; 185

1. \$116.17.
2. \$38.40.
3. \$11,424.89.
4. \$6198.43.
5. \$5255.57.
6. \$811.
7. \$51.60.
8. Sec. \$15.08.
9. \$22,076.28.

Page 70; 186

1. \$3.99.
2. \$6.50.
3. \$4.35.
4. 800 boxes.
5. \$2.67.
6. $\frac{5}{8}$ T;
1,890 $\frac{1}{4}$ lb.
7. $\frac{1}{4}$.
8. \$2.81.
9. $\frac{1}{16}$; \$100.
10. \$4105.
11. $4\frac{1}{2}$ da.
12. \$201.92;
\$276.92.
13. 80; 18,750.
14. $1\frac{1}{4}$ in.
15. 20 bu.

Page 75; 191**I**

1. 206.568.

2. 235.722.
3. 21.3725.
4. 22.32589.
5. 700.108.
6. 680.40235.
7. 234.695.
8. 25.1429.
9. 222.585.
10. 123.27114.

II

1. 1.74.
2. 1.5036.
3. 31.13.
4. 8.774.
5. 3.749.
6. 0.3976.
7. 1.767.
8. 1.5306.
9. 27.926.

10. 5.57.

11. 5.893.
12. 2.5416.
13. 23.8352.
14. 8.557.

III

1. 258.797.
2. 47.252.
3. 203.3074.
4. 63.045.
5. 185.41.
6. 44.5387.
7. 226.472.
8. 396.3544.
9. 152.807.

10. 3.192.
11. 23.5237.

IV

1. 182.62.
2. 1.2541 $\frac{1}{2}$.
3. 2.886.
4. 7959.2.

5. 6.
6. 0.235.
7. 0.16 $\frac{1}{4}$.
8. 0.016 $\frac{1}{4}$.
9. 1.6 $\frac{1}{4}$.

Page 79; 195

1. 3600.
2. 0.289.
3. 78.4.
4. 0.39.
5. 70.5.
6. 113.5.
7. \$8.9125.
8. 640.0287.
9. 55.1286.
10. 3560.
11. 0.583 $\frac{1}{4}$.
12. 0.5625.
13. 0.266 $\frac{1}{4}$.
14. 0.428 $\frac{1}{4}$.
15. 0.555 $\frac{1}{4}$.
16. 0.233 $\frac{1}{4}$.
17. 1.0625.
18. 1.277 $\frac{1}{4}$.
19. 0.938 $\frac{1}{4}$.
20. 0.976 $\frac{1}{4}$.
21. 0.260 $\frac{1}{4}$.
22. 2.529 $\frac{1}{4}$.
23. 1.622 $\frac{1}{4}$.
24. 1.371 $\frac{1}{4}$.
25. 0.175 $\frac{1}{4}$.
26. 0.903 $\frac{1}{4}$.
27. 0.916 $\frac{1}{4}$.
28. 0.555 $\frac{1}{4}$.
29. 0.5454 $\frac{1}{4}$.
30. 0.183 $\frac{1}{4}$.
31. 0.466 $\frac{1}{4}$.
32. 0.0016 $\frac{1}{4}$.
33. 0.388 $\frac{1}{4}$.
34. 0.2307 $\frac{1}{4}$.

35. 1.12.
36. 0.06 $\frac{1}{4}$; 6 $\frac{1}{4}$ %.
37. 78%.

Page 81; 197

1. 10,400; 12,800;
8400; 8400.
2. \$1.15; \$1.38.
3. \$1.00.
4. 3756.22 $\frac{1}{2}$ ft.
5. 100 mi.
6. \$1,840.
7. \$728.89.
8. 90 sq. in.
9. \$115,520.98.
10. \$180.60.
11. 64 cd.
12. \$635.

Page 83; 199

2. \$147.
3. \$87.
4. \$64.
5. \$1000.
6. \$67.67.
8. \$4.00.
9. \$1.88.
10. \$1.87.
11. \$3.72.
12. \$9.33.
13. \$33.26.
14. \$94.50.
15. \$11.63.

Page 86; 202

24. 36 mi. 23,040 A.
25. 138 $\frac{1}{2}$ sq. ft.
26. 45 $\frac{1}{10}$ sq. rd.
27. 78,135 $\frac{1}{2}$ sq. ft.
28. 43,580 sq. ft.
29. 272 $\frac{1}{2}$ sq. ft.

30. 217,800 sq. ft.
31. $6\frac{7}{11}$ sq. rd.
32. $11\frac{1}{2}$ A.
33. \$3411.50.
34. $73\frac{503}{1089}$ sq. rd.

Page 91; 207

9. 500; $3\frac{1}{2}$.
10. 1020.
11. $8\frac{1}{2}$ sq. yd.
12. 729.
13. 4 A.
14. \$3482.50.
15. \$180.
16. $5\frac{1}{3}\frac{1}{3}$.
17. 633,600.
18. \$0.80.
20. \$17.50.
21. 75 ft.

Page 92; 208

3. 6; 6; 36.
4. 7; 7; 49;
\$61.25.
5. 5; $33\frac{1}{2}$.
6. \$70.
7. \$26.67.
8. \$28.35.
9. \$258.90.
10. \$24.83.
11. \$90.92.

Page 93; 209

1. $21\frac{7}{8}$ sq. ft.
2. 770.
3. 14.
4. $105\frac{5}{8}$; 2850.
5. 26136.
6. 70.
7. $1\frac{1}{2}$ sq. ft. more.
10. $71\frac{1}{2}$ sq. yd.

95-6; 211-12

1. \$4098.60.
2. \$300.
3. \$604.08.
4. \$937.50.
5. \$1350.
6. \$2559.38.
7. \$1728.
8. \$2245.32.
9. \$1975.59.
10. \$1447.88.
11. \$937.20.
12. \$1929.60.
13. \$272.68.
14. \$350.35.
15. \$57.00.
16. \$391.
17. \$67.50.
18. \$124.
19. \$320.
20. \$1593.33.
21. \$42.27.

Page 99; 215

3. 360 sq. ft.
4. 750 sq. ft.
5. $1\frac{1}{2}$ sq. ft.
6. 231 sq. ft.
7. $73\frac{1}{2}$ sq. ft.
8. $6975\frac{1}{2}$ sq. ft.
9. 1248 sq. ft.
10. $57\frac{1}{2}$ sq. yd.
15. 396 sq. in.
16. 7500 sq. ft.
18. 75 sq. ft.
19. 98 sq. in.

Page 100; 216

8. $93\frac{3}{4}$ sq. ft.
9. 10,560 sq. ft.
10. $11\frac{1}{2}$ sq. ft.
11. $3\frac{3}{4}$ sq. ft.

Page 101; 217

2. 256 sq. in.
3. $2\frac{1}{2}$ sq. ft.
4. 90° .
5. 465 sq. in.
6. $74\frac{1}{2}$ sq. in.
7. \$2756.25.
8. $330\frac{70}{111}$ sq. rd.
9. $\frac{2}{3}$ as large.
10. 714 sq. in.
11. 9. 82 sq. ft.
12. 16,500 sq. ft.
13. $17\frac{1}{2}$ sq. ft.
14. 3,484,800 sq. ft.
15. $153\frac{1}{2}$ sq. ft.
16. 50 sq. yd.
17. \$2.56.

Page 103; 219

16. 62.832 ft.
17. 65.2535 ft.
18. 565.488 ft.
19. 1.48 ft.
20. 51.05 in.
21. 1.19 ft.

Page 104; 220

6. 37.6992 ft;
113.0976 sq. ft.
7. 37.6992 ft;
113.0976.
8. 31.8309;
795.2269.
9. 7.95; 198.925
10. 706.86 sq. ft.
11. 1385.45 sq. ft.
12. 12,732.4 sq. in.
13. 1590.435.
14. 855.30 sq. rd.
15. 5026.56 sq. yd.
16. 928 + sq. ft.

17. 51 — acres.

18. 1134.1176 sq. rd.
19. 104,062.358 sq. ft.
20. 7238.246 sq. in.
21. 5944.69 sq. ft.

Page 108; 224

6. $\frac{\pi}{3}$.
7. 18.8496.
8. 234.44 ft.
9. 9685.84 sq. ft.
10. 10.2744 sq. in.
11. $63\frac{1}{2}\%$.
12. 339.2928 sq. ft.
13. $60\frac{1}{2}\%$.

Page 110; 226

10. 216 cu. in.
11. 512 cu. in.
12. 125 cu. ft.
13. 1728 cu. ft.
14. 1000 cu. yd.
15. 8000 cu. in.

Page 111; 227

4. 180 cu. in.
5. 400 cu. in.
6. 7.5 cu. ft.
7. 1280 cu. ft.
8. 4.5 cu. ft.
9. 4608 cu. ft.
10. $11,333\frac{1}{3}$ cu. ft.
11. 500 cu. ft.
12. $177\frac{1}{2}$ cu. ft.
14. 30 cu. in;
300 cu. in.
15. 96 cu. yd.
16. $7\frac{1}{2}$ cu. ft.
17. $8\frac{1}{2}$.

Page 112; 228

10. \$18.
11. \$100.
12. \$112.50.
13. \$19.69.
14. \$29.30.
15. \$5.36.
16. 320 ft.

Page 113; 229

4. 10 bd. ft.
5. 120 bd. ft.
6. 10 bd. ft.
7. 37.5 bd. ft.
8. 256 bd. ft.
9. 96 bd. ft.
10. 140 bd. ft.
11. 270 bd. ft.
12. 216 bd. ft.
13. 8 bd. ft.

Page 114; 230

4. 5 in.
5. 486 cu. in.
6. 600 cu. in.
7. 1536 cu. in.
8. 8 in.
9. 10 in.
10. 7 in.
13. 114 sq. in.
16. 248 sq. in.
17. 468 sq. in.
18. 544 sq. in.
19. 848; 82.
20. 552; 88½.
21. 576; 22½.

Page 116; 232

10. 502.656 cu. ft.
11. 752.0256 gal.
12. 628.32 cu. ft.
13. 7 in.

Page 117; 233

1. 182.9876.
2. \$13.96.
3. 280 +.
4. 109.956 sq. ft.

Page 118; 234

1. 24; 11.
2. 16.
3. 6.
6. 78 sq. ft.
7. 12 in.
8. 120 ft.
9. 3 yd.
10. 544½ ft.
11. 26 in.
12. 18 ft.
13. 9 in.
14. 96 rd.
15. 20 in.
16. 62,500 sq. ft.
17. 160 rd;
416 rd.
18. 6 ft. by 18 ft.

Page 119; 235

1. \$10.
2. 4 days.
3. 6 in.
4. 12 ft.
5. 12 in.
6. 4 ft.
8. 30 in.
9. 1½ ft.
10. 2.8 ft.
11. 6 in.
12. 660 ft.

Page 120; 236

1. 4½ ft.
2. 184,078½ gal.
3. \$48595.

4. \$133,650.

5. 7 ft.
6. \$2242.50.
7. 21,780 cu. ft.
8. \$192.
9. \$5.40.
10. 22050.
11. 21 sq. ft.;
252 cu. ft.

Page 121; 237

1. \$50.63.
2. 10,939½ lb.
3. \$26.98.
4. 1565.44 T.
5. 37.6992 bbl.
6. 603.1872 sq. in.
7. \$276.67.
8. \$5760.
9. \$476.80.
11. 12½%.
12. \$92.80.

Page 122; 238

1. 0.2146.
2. 909.
3. \$6106.88.
4. 170½.
5. 13¢.
6. 1 to 1000.
7. \$17.81.
8. 630.
9. 8 + min.
10. 4950 ft.
11. 85 yd.
12. \$27.06.
13. 500 lb.

Page 124; 240

1. \$10,000.
2. 433.
3. 45,375.

4. 107.2 mi.

5. 4 P.M. Mar. 21.
6. \$2822.40.
7. 1.
8. \$63.25.
9. \$51.84.
10. \$17.28.
11. 67½%.
12. 29,538.

Page 126; 242

1. 152.210.
2. \$4.65.
3. \$8320.
4. \$287.10.
5. \$312.48.
6. 25% loss.
7. \$55.04.
8. \$345.
9. \$68.25;
\$123.50.
10. 5%.
11. \$1808; \$7.53
12. 20½.

Page 128; 244

1. \$133.35.
2. 55.13.
3. 22½ sq. yd.
4. 594 cu. yd.
5. 62½%.
6. \$18.
7. \$79.33.
8. ½ or 33⅓%.
9. 56¼%.
10. \$8320.
11. ⅓ or 10%.
12. \$4.60.
13. \$4095.24.
14. ⅓%.
18. 42.

ANSWERS

BOOK III, PART II (3-vol. ed.)

BOOK II, CHAP. III (2-vol. ed.)

NOTE. — The first page-number refers to the 3-vol. ed.; the second, to the 2-vol. ed.

Page 136; 252	4. \$467.	14. \$1241.67.	5. 16$\frac{1}{2}$.
5. 1419.4 bu.	5. \$3125.	15. \$12,000.	6. 25%.
6. \$2958.	6. 66 gal.	16. 36$\frac{1}{4}$%.	7. 33$\frac{1}{3}$%.
7. \$337.50.	7. 97 yd.	17. \$613.97.	8. 3$\frac{1}{4}$% more is
8. 4301 bu. corn.	8. 250,000;	Page 140; 256	gained by
3542 bu. oats.	106,000.	1. 12%.	buying for
4807 bu. wheat.	9. 7900.	2. 960.	\$4 and sell
9. 935$\frac{1}{2}$ T.	10. \$950,000.	3. 27$\frac{3}{13}$%.	ing for
10. 58.8 mi.	11. 150,000,000 sq.	4. 40 A.	\$4.80.
11. 955$\frac{1}{2}$ A.	mi.	5. 92%.	9. \$9.
12. \$2.44.	12. 656.	6. \$1728.	10. 33$\frac{1}{3}$%.
13. \$209.25.	13. \$251,940.	7. 56$\frac{1}{4}$%.	11. Loss \$100.
14. \$51.19.	14. 2032.	8. 225 cd.	12. Loss 20%.
15. 100 to 1.	15. \$1175.	9. $\frac{2}{3}$%.	13. 145.4545+.
17. \$56,000.	Page 139; 255	10. 7800 T.	Page 142; 258
18. \$560.	1. Alike profit.	11. 4%.	1. \$4.80.
19. \$434.	2. 100 to 1.	12. 18%.	2. \$72.
137-8; 253-4	3. 25%.	13. 13$\frac{3}{8}$%.	3. \$5568.
2. 71%.	4. 58$\frac{1}{2}$%.	14. \$9600.	4. \$6000.
3. 90%.	5. 45%.	15. 5$\frac{1}{2}$%.	5. 71.
4. 30,000 T.	6. 95%.	16. 3456.	6. 300 A.
5. \$17,634.37;	7. 16$\frac{1}{4}$%.	17. 3.8+ %.	7. \$47,000.
45$\frac{3}{8}$%.	8. 4; 300; $\frac{2}{3}$%.	18. \$4500.	8. \$2000.
6. 32%.	9. 6; 1600; $\frac{1}{4}$%.	19. \$72.90.	9. 35%.
7. \$21.25.	10. 112; 83$\frac{1}{2}$%;	20. 1600.	10. \$1.60.
8. 44$\frac{1}{3}$%.	16$\frac{1}{2}$%.	Page 141; 257	11. \$3.50.
9. 60%.	11. 1$\frac{3}{4}$; 140; $\frac{1}{2}$.	1. \$6500.	Page 144; 260
10. 17$\frac{1}{2}$%.	12. 33$\frac{1}{4}$%; 3$\frac{1}{2}$%;	2. \$24,640.	1. \$96.
11. 46,947—.	25%.	3. \$60; \$72.	2. \$48.
2. \$963.	13. 625; 2000;	4. 33$\frac{1}{3}$%.	3. \$32.
3. \$635.	1000.		

4. \$30.
5. \$30.
6. \$35.
7. 25 %
8. \$20 or 25 %
9. 20 %
16 $\frac{1}{2}$ %
10. 1 $\frac{1}{4}$ %
11. \$870.
12. \$7.81.
13. \$5000.
14. \$50,000.

Page 145; 261

1. 18 $\frac{1}{4}$ % or 14 $\frac{1}{2}$ %
2. \$10.
3. 20 %
4. \$48,000.
\$50,400.
5. \$119.
6. 15 $\frac{1}{4}$ %
7. 4 $\frac{1}{2}$ %
8. 8 $\frac{1}{2}$ %
9. 50 %
10. 14 $\frac{1}{11}$ %
11. 8 %
12. \$5200.
13. \$4.

Page 147; 263

3. \$44.80.
4. \$137.60.
5. \$28.03.
6. \$5.88.
7. \$298.54.
8. \$375.
9. \$104.99.
10. \$125.16.

Page 148; 264

9. \$8.71.
10. \$9.92.

11. \$1.56.
12. \$1.71.
13. \$1.36.
14. \$3.13.
15. \$20.83.
16. \$11.68.
17. \$38.65.
18. \$0.05.

Page 149; 265

6. \$10.67.
7. \$15.53.
8. \$13.37.
9. \$14.21.
10. \$6.43.
11. \$1.90.
12. \$4.09.
13. \$9.06.
14. \$1.01.

Page 150; 266

3. \$545.85.
4. \$7920.11.
5. \$1909.96.
6. \$95.06.
7. \$1135.24.
8. \$214.23.
9. \$92.52.

Page 151; 267

10. \$1187.25.
11. \$483.69.
12. \$18.48.
13. \$1266.66 $\frac{1}{3}$.
7. 5 yr. 21 da.
8. 3 yr. 2 mo. 6 da.
9. 2 yr. 10 mo. 21 da.
11. 2 yr. 1 mo. 3 da.

Page 152; 268

1. \$14.49.
2. \$95.
3. \$17.09.
4. \$7.99.
5. \$7.52.
6. \$37.50.
7. \$13.24.
8. \$4.61.
9. \$21.85.
10. \$166.45.
11. \$1.89.
12. \$1.67.
13. \$49.80.
19. \$88.

Page 153; 269

4. \$144.
6. \$4.93.
7. \$9.70.
8. \$7.76.
9. \$11.05.
10. \$16.77.
11. \$29.59.
12. \$160.93.

Page 154; 270

1. \$26.79.
2. \$759.54.
3. \$540.11.
4. \$15.96.
5. \$900.
6. \$540.08.
7. \$234.
8. \$60.67.
9. \$25.20.
10. \$3.15.
11. \$3.47.
12. \$97.86.
13. \$147.52.

14. \$4.41.
15. \$19.44.
16. \$10.
17. \$227.50.
18. \$746.67.
19. \$58.90.
20. \$105.22.
21. \$333.33.
22. \$1.29.
23. \$48.95.
24. \$1312.50.
25. \$4.25.

Page 155; 271

1. \$555.21.
2. \$164.68.
3. \$71.35.
4. \$1316.10.
5. \$2607.85.
6. \$917.59.
7. \$5663.92.
8. \$96.63.
9. \$12,837.98.
10. \$265.45.
11. \$552.59.
12. \$26,614.07.
13. \$76.72.
14. \$33.77.
15. \$921.65.
16. \$10,086.95.
17. \$267,793.01.
18. \$56.52.
19. \$804.37.
20. \$1396.14.
21. \$15.24.
22. \$438.90 or \$438.85.
23. \$530.78.
24. \$443.06.
25. \$971.10.
26. \$189.24.

27. \$3014.35.	36. \$19.74.	77. \$19.36.	118. \$20.27.
28. \$2853.33.	37. \$78.06.	78. \$37.12. *	119. \$102.39.
29. \$114.28.	38. \$16.04.	79. \$557.81.	120. \$186.91.
30. \$449.50.	39. \$340.55.	80. \$41.52.	121. \$17.44.
Page 156; 272			
1. \$475.31.	40. \$12.10.	81. \$77.98.	122. \$13.25.
2. \$414.57.	41. \$56.79.	82. \$4.33.	123. \$46.04.
3. \$773.44.	42. \$38.56.	83. \$12.90.	124. \$4.48.
4. \$30.51.	43. \$111.18.	84. \$36.32.	125. \$19.38.
5. \$11.20.	44. \$4.22.	85. \$10.42.	126. \$16.20.
6. \$8.74.	45. \$3.67.	86. \$29.51.	127. \$96.44.
7. \$121.33.	46. \$93.02.	87. \$42.91.	128. \$15.10.
8. \$26.79.	47. \$112.36.	88. \$1216.19.	129. \$14.88.
9. \$444.01.	48. \$201.56.	89. \$28.89.	130. \$228.99.
10. \$38.55.	49. \$62.56.	90. \$234.17.	131. \$18.47.
11. \$864.91.	50. \$38.49.	91. \$8.51.	132. \$570.65.
12. \$34.42.	51. \$56.79.	92. \$1412.15.	133. \$54.85.
13. \$20.30.	52. \$39.32.	93. \$51.92.	134. \$52.08.
14. \$45.28.	53. \$45.85.	94. \$121.48.	135. \$25.11.
15. \$49.23.	54. \$314.53.	95. \$13.51.	136. \$62.50.
16. \$125.16.	55. \$31.22.	96. \$540.00.	137. \$104.61.
17. \$41.36.	56. \$48.01.	97. \$27.34.	138. \$363.48.
18. \$719.29.	57. \$422.04.	98. \$54.44.	139. \$133.11.
19. \$33.66.	58. \$22.27.	99. \$8.80.	140. \$551.54.
20. \$85.37.	59. \$502.11.	100. \$15.34.	141. \$30.52.
21. \$511.25.	60. \$40.83.	101. \$71.32.	142. \$117.79.
22. \$32.06.	61. \$17.66.	102. \$516.98.	143. \$146.07.
23. \$1170.68.	62. \$6.84.	103. \$66.74.	144. \$53.32.
24. \$38.35.	63. \$42.88.	104. \$1933.70.	145. \$34.00.
25. \$55.39.	64. \$64.22.	105. \$48.12.	146. \$580.32.
26. \$27.99.	65. \$3.02.	106. \$89.98.	
27. \$525.56.	66. \$126.34.	107. \$67.24.	Page 158; 274
28. \$36.83.	67. \$36.50.	108. \$2.77.	1. \$1900.
29. \$356.58.	68. \$10.75.	109. \$1952.00.	2. 10%.
30. \$54.17.	69. \$17.86.	110. \$327.36.	3. \$500.
31. \$708.15.	70. \$12.25.	111. \$53.30.	4. \$1128.
32. \$49.47.	71. \$306.	112. \$17.66.	5. 3.46%.
33. \$7.60.	72. \$17.25.	113. \$11.83.	6. 2000.
34. \$22.14.	73. \$107.26.	114. \$64.80.	7. 16⅓%.
35. \$33.94.	74. \$10.55.	115. \$38.73.	8. 4%.
	75. \$11.20.	116. \$16.90.	9. \$1.50.
	76. \$14.58.	117. \$23.22.	

10. \$500.
11. 2%
12. \$70.
13. 44.
14. 2%

Page 159; 275

2. \$114.
3. \$0.25.
4. First $\frac{1}{2}$ % or
\$1.20 (better).
5. Third.
6. \$1170.
7. \$24.26.
8. \$320.10.
9. \$5.24.
10. \$240.88.
11. \$2390.08.

Page 160; 276

1. \$1400. \$1425.
2. \$10,590.
3. \$3920.
4. 73%
5. 15%
6. 20%
7. \$313.63.
8. \$10,397.75.
9. \$598.50.
10. \$555.58.
11. \$675.88.
12. \$67.21.

Page 162; 278

1. \$10,000.
\$10,000.
\$2000.
2. \$5000.
3. $1\frac{1}{2}$ %
4. $1\frac{1}{2}$ %
5. \$6857.14.

6. \$4000.
7. \$93.75.
8. \$31.60.
9. \$15,843.75.
10. \$23,333.33.
11. 2%
12. \$2400.
13. \$1,500,000.
14. 18%
15. \$50,000.
16. \$50,000.

Page 164; 280

3. \$168.50.
4. \$10971.
5. $\frac{3}{4}$ %
6. 3%
7. $1.77\frac{1}{2}$ %
8. $2\frac{1}{2}$ %
9. $1\frac{1}{2}$ %
10. $14\frac{1}{2}$ %
11. $3\frac{1}{13}\frac{1}{3}$ %
12. 3%
13. 2%
14. B's Com.
\$12.08; A's
profit \$40.42.
15. Com. 4%
Cost \$5000.
16. \$7783.16.

Page 166; 282

1. \$19.50.
2. 200 bbl.
3. \$30.
4. \$4170.
5. 115 bbl.
6. \$39.
7. \$11,573.75.
8. \$170.50.
9. 5%.

10. $7\frac{1}{2}$ %
11. 100 M.
12. $2\frac{1}{2}$ %.

Page 167; 283

1. \$314.93.
2. \$12,000.
3. \$4123.38.
4. \$7600;
com. \$400.
5. \$16.87.
6. \$9,250,000.
7. \$4000.
8. \$30,000.
9. \$6297.63.
10. \$58.87.

Page 168; 284

1. \$8.74;
\$428.26.
2. \$2750; \$2675.
3. \$25; 10%
4. \$918.37;
\$18.37.
5. $1\frac{1}{2}$ %; \$1082.
6. \$1552.80;
\$67.20.
7. \$450.70; 3%
8. \$421.05.
9. \$526.67.
10. \$200.00
9.63
4.37
\$214.00.
11. \$20,000.
12. \$589.20;
1.12 + %
13. \$3.52;
2.37 + %
14. \$777.65; 3%
15. \$207.90; \$198.

16. \$1250;
\$43.75.
17. \$787.49;
\$15.39.

Page 171; 287

1. \$261.52;
\$261.64
(grace).
2. \$931.60;
\$932.07
(grace).
3. \$737.08;
\$737.39
(grace).
4. \$1963.20;
\$1963.80
(grace).
5. \$801.95;
\$802.35
(grace).
6. \$297.57;
\$297.68
(grace).
7. \$76.50;
\$76.58 (grace).

Page 176; 292

7. \$780.
8. \$3180.
9. \$576.31.

Page 177; 293

1. \$455.80.
2. \$700.62.
3. \$561.13.
4. \$1290.23.
5. \$664.80.
6. \$4431.71.
7. \$939.84.
8. \$110.30.
9. \$1755.

Page 179; 295

1. \$300,000.
2. \$50,000;
\$10,000.
3. \$15 on \$1000;
 $1\frac{1}{2}\%$ on \$1;
\$8000.
4. $1\frac{1}{2}\%$; \$0.012;
 $1\frac{1}{2}\%$
5. $1\frac{1}{8}\%$; \$1.48.
6. \$33.33.
7. \$2.
8. \$66.67.
9. \$76.93-.
10. \$15.69-.
11. \$12.86-.
12. \$6.67.
13. \$12.56-.
14. \$17.
15. \$112.50.
16. \$3876.75.
17. \$12.30-.

Page 181; 297

9. 8243.2.
10. \$123.65.
12. Specific duty
\$40 more.
13. \$60.75; $3\frac{1}{2}\%$.
14. $122\frac{1}{2}\%$; \$150.
15. \$450.80.
16. 20% .
17. \$0.32 gain.

Page 182; 298

6. \$1226.75.
7. \$111.40.

Page 183; 299

1. \$78.81.
2. \$206.46.

3. \$449.95.
Int. Table.
1. \$551.91.
2. \$713.21.
3. \$367.58.
4. \$877.50.

Page 186; 302

1. \$790.70
(grace);
\$791.
2. \$713.90
(grace);
\$714.
3. \$8.97 (grace);
\$8.75.

Page 187; 303

1. \$2.89, \$522.11
(grace);
\$2.63,
\$522.37.
2. \$906.34
(grace);
\$906.68.
3. \$310.82
(grace);
\$311.04.
4. \$784.50
(grace);
\$785.
5. \$953.28
(grace);
\$953.60.
6. \$712.41
(grace);
\$712.74.
1. July 7/10; 27
da. or 30 da.

2. Feb. 15/18; 63
da. or 66 da.
3. Oct. 5/8; 37
da. or 40 da.
4. June 17/20; 47
da. or 50 da.
5. Aug. 14/17;
67 da. or
70 da.
6. Feb. 24/27; 26
da. or 29 da.
7. Jan. 19/22; 70
da. or 73 da;
2 mo. 9 da;
2 mo. 12 da.
8. May 11/14; 66
da. or 69 da;
2 mo. 5 da.
or 2 mo. 8 da.

Page 188; 304

1. 63 da. or 66 da.
2. 24 da.
3. \$438.
4. \$994.86.
5. \$795.33.
6. \$447.65
(grace);
\$447.80.
7. \$868.45
(grace);
\$868.81.
8. \$971.54
(grace);
\$972.03.
9. \$693.99
(grace);
\$694.45.
10. \$838.37
(grace);
\$838.76.

11. \$1248.12
(grace);
\$1248.59.

1. \$1080.
2. \$1063.80.
\$1063.26
(grace).

Page 189; 305

1. \$1223.64.
2. \$500.09
(grace);
\$500.14.
3. \$726.92
(grace);
\$726.81.
5. \$396.44
(grace);
\$396.18.
6. \$981.14
(grace);
\$980.56.
7. \$1272.
8. \$1240.20
(grace);
\$1239.67.
9. \$1214.76
(grace);
\$1214.12.
10. \$1195.68
(grace);
\$1195.04.
11. 9% .
12. \$452.88
(grace);
\$452.96.
13. \$725.92
(grace);
\$725.98.

14. \$956.74

(grace);

\$956.64.

15. \$806.53

(grace);

\$806.47.

16. \$277.48

(grace);

\$277.53.

17. \$5039.03

(grace);

\$5037.80.

Page 194; 310

1. \$5022.50.

2. \$1977.50.

3. \$12,000.

4. 180 shares.

5. \$68,400.

6. 12½%.

7. 31 shares;

\$92.

8. 316 shares.

9. 40 shares.

10. \$181,250.

Page 197; 313

1. 6¼%.

2. 4%.

4. 3% bond.

5. 4½%.

6. \$62.50 gain.

7. 7½%.

8. \$4875 loss.

9. Equal.

10. \$210.

11. 80 shares;

\$20.

12. 697½.

13. \$40; latter.

Page 203; 319

1. 2872.5.

2. \$21.56.

3. \$217.01½.

4. \$2085.71.

5. \$312.65.

6. \$73.46.

7. \$6185.

8. \$1265.25.

9. \$12.09.

10. \$5.21.

11. \$40.41.

12. \$89.24

(grace);

\$87.70.

13. \$51.14

(grace);

\$49.61.

14. \$194.74

(grace);

\$193.95.

Page 204; 320

1. \$250.

2. 0.605%.

3. \$150.

4. \$68.80.

5. \$256.10.

6. \$845.56.

7. \$941.11.

8. \$1886.70.

9. \$1213.21.

10. \$1590.

11. Gain \$14.25.

12. \$1960.78.

13. \$289.59.

14. \$511.31

(grace);

\$511.57.

15. \$75.

16. \$500.

Page 205; 321

1. \$1125.

2. 5.13 qt.

3. \$5.47.

4. 3.278+ %.

5. Loss \$407.88.

6. 28⅔%.

7. 45⅓%.

8. \$1890 net loss.

9. \$4,800,000.

10. Latter \$27.28.

Page 207; 323

18. 300.

19. 33½.

20. 80.

21. 9.

22. ½.

23. 8 yd.

24. \$20.

25. 75.

26. 60.

27. 96.

28. 65.

29. 43.5.

2. \$15.

3. \$378.

Page 208; 324

5. 9 da.; 3:4.

6. 7 mo.

7. \$11.50.

8. \$33.92.

9. 96 men.

10. 17½.

11. 4½.

12. 56 men.

13. \$4.80 per bbl.

Page 209; 325

2. 60½ da.

3. 2⅔.

4. \$819.

5. 8100 times.

6. 112 ft.

7. 126 mi.; 231 mi.

(depends on
rate).

8. 960 bu.

9. \$3.40.

10. 11 bbl.

Page 210; 326

1. \$62.50.

2. 2.7 mi.

3. \$2.50.

4. \$18.

5. 48 yd.

6. 14 rev.

7. 22½ da.

8. 18 men.

9. \$126.

10. 5½ hr.

11. 22½ da.

12. 4285.71 mi.

13. \$133.35.

14. 24 A.

Page 211; 327

5. 35.

8. 96.

9. 630.

10. 441.

11. 343.

12. 420.

Page 213; 329

13. 23-.

14. 26.

15. 34.

16. 42.

17. 45.

18. 54.

19. 63.
20. 68.
21. 75.
22. 84.

Page 214 ; 330

3. 28.
4. 58.
5. 92.
6. 56.
7. 83.
8. 52.
9. 73.
10. 67.
11. 99.
12. 87.
13. 53.
14. 97.

Page 215 ; 331

1. 532.
2. 547.
3. 636.
4. 746.
5. 869.
6. 2453.
7. 728.
8. 696.
9. 799.
10. 852.
11. 877.
12. 967.
13. 1074.
14. 1217.
15. 1594.

Page 216 ; 332

1. 0.75.
2. 0.96.
3. 6.5.

4. 0.8848+.
5. 0.9433+.
6. 4.4121+.
7. 28.7210+.
8. 4.1273+.

9. 0.8.
10. 0.2529.
11. 43.9590.
12. 27.9991+.
13. 15.03.
14. 1430.
15. 8.74.
16. 28.28+.
17. $\frac{1}{12}$.
18. 0.559+.
19. $2\frac{3}{4}$.
20. 2.380+.
21. 9.099+.
22. 0.5422+.
23. 12.3237+.
24. 1.4790+.

1. 307.
2. 0.8538+.
3. 3.7249+.
4. 1004.
5. 3136.
6. 7921.
7. 45.09.
8. 0.9682+.
9. $1\frac{1}{2}$.
10. 999.
11. $9\frac{1}{4}$.
12. 64.
13. 1.4142+.
14. 0.4472+.
15. 0.19364+.
16. 11.2743+.
17. 28.0178+.
18. 1856.
19. 30.2324+.
20. 0.800813+.

Page 217 ; 333

1. 8.94+.
2. 3.21+.
3. 2.53+.
4. 3.13+.
5. 2.68+.
6. 4.17+.
7. 3.87+.
8. 2.92+.
9. 3.06+.
10. 2.64.
11. 1.82+.
12. 0.8862+.
13. 6.28+.
14. $\frac{8.18+}{3}$; 2.72+.
15. 0.6.
16. 2.39+.
17. 8.89+.
18. 5.87+.
19. 8.00+.
20. 6.058+.

Page 219 ; 335

1. 60 ft.
2. 68 ft.
3. 57 ft.
4. 115 ft.
5. 42.42+ ft.
6. 25.61+ in.
7. 8.60+ ft.
8. 223.60+ rd.

Page 220 ; 336

1. 8.
2. 8.66+.
3. 24.16+ ft.
4. 21.93+ ft.
5. 73.32+ sq. ft.

6. Altitude,
20.78+ ft.;
area,
249.36+ sq. ft.
7. \$141.40.
9. 259.8 sq. in.

Page 221 ; 337

2. 29.67+ ft.
3. 29.39 ft.
4. 13.4 ft.
5. 8.
6. 25.37+ rd.
7. 67.8+ mi.
8. 1017.8784 sq. in.
9. 5.56+.
10. 270.4+ ft.
11. 18.02+ ft.
12. 17.97+ ft.

Page 222 ; 338

1. 6.9282+ rd.
2. 43.863 ft.
3. 5:4.
4. 21.089 rd.
5. 208.71+ ft.
6. 97.616+ ft.
7. 63.639 ft.
8. 101.98+ ft.
9. 108 ft. by 36 ft.
10. 20.78+ ft.
11. 27.12+ ft.
12. 136 sq. in.
13. 2368.074 ft.
14. 61.4 rd.

Page 225 ; 341

1. $29\frac{1}{2}$ cu. ft., or
29.629+ cu. ft.

3. 471.4 cu. in.
4. 1500 cu. in.
5. 6600 lb.
10. 96 sq. in.
11. 384 sq. in.
12. 62.35+ sq. in.
13. 720 cu. in.
14. S. H. 16.15+
in.; c. sur-
face 387.6+
sq. in.

Page 227; 343

1. 1 lb.
2. 14.1372 cu. in.
3. 24 cu. in.
4. 6 sq. in.
5. 37.6992 cu. ft.
6. 8 oz.
9. 40 sq. in.
10. 20.1219+ sq. ft.
11. 93.4626.
12. 219.912 sq. ft.
13. 35.51 sq. yd.

Page 230; 346

1. 0.5236.
2. 0.4764;
0.5236 rem.
3. 33.5104 cu. in.
4. 235.62 lb.
5. 1.105 lb.
6. 4,188,800,000
cu. mi.
7. 64.
8. 67.0208 cu. in.
9. 113.0976 sq. in.
10. 12,566,400 sq.
mi.
11. 9.715 lb. avoir.
12. \$5½.
13. 486 oz.

Page 233; 349

3. \$2700.
4. 4:9.
5. \$18.56.
6. 13½.
7. 5.
8. \$78.75.
9. \$21.09.
10. 27 lb.
11. 1171.87½ bu.
12. 96 hr.

Page 237; 353

1. \$9.25.
2. 681.7925+ sq.
ft.
3. 16 rd.
5. 42½ sq. ft.
6. 315 sq. ft.
7. \$32.26.
8. 124.686.
9. 875.
10. 1.27324 ft.
11. 3 ft.
12. 768 sq. ft.
13. 4.1888 cu. ft.

Page 238; 354

1. 1080.
2. 6.2882 cu. in.
3. 12.65- in.
4. 530.145 sq. in.
5. 24902.18142+.
6. 180 rd.;
169.68+ rd.;
150.40- rd.
7. 94.81+.
8. 26.529+.
9. 4:3½.
10. 1607.8125 lb.
11. 14.9334+ ft.

12. 28.2744.
13. 18,000 lb.
14. 706.86 sq. ft.

Page 244; 360

1. 847,200 g.;
1867.75 lb.
2. 26.43 Hl.
3. 16.72 sq. m.
4. 1312.359 yd.
5. 395.38 sq. rd.
6. 1000 l.
7. \$10.63 gain.
8. 960 Kg.
9. 88.9056 Kg.
10. 2.845184 Mm.
11. \$3.3108.
12. 56 Ha.;
138.38 A.
13. 264.17 gal.
14. 800.
15. \$3.21.
16. 196.875 Kg.
17. 7500 m.
18. 13.928694 T.
19. 1.9 nearly.

Page 246; 362

3. 12:53:36 p.m.
4. 7:15:48 a.m.
5. 5:53:20 p.m.
6. 6:9:32 a.m.
7. 6:33:20 a.m.
8. 6:25:8 a.m.
9. 11:59:36 a.m.
10. 5:21 p.m.
11. 12:9:20 p.m.
12. 3:5:16 a.m.

Page 251; 367

1. \$60,000.
2. \$160.

3. 8¼%.
4. \$21,000.
5. 6 in.
6. \$2.60.
7. \$1.57.
8. 67,200.
9. 8½%.
10. 940 bbl.
11. 33¼%.

Page 252; 368

1. \$33,280; \$80
brok.
2. Dec. 22, 1903.
3. \$148.29.
4. \$153.58.
5. 36 weeks.
6. \$10,844.
7. \$80.
8. 672 ft.
9. 112.77.
10. \$346.15.
11. 105,753.6 gal.

Page 253; 369

1. \$80.
2. \$1800.
3. \$1.83.
4. 0.927-.
5. 1282+ bbl.
6. \$0.53.
7. \$24 increase.
8. \$77.91.
9. \$1256.25;
99,243.75.
10. 12,480 lb.
11. \$22,000,000.
12. \$32.40.
13. 939.84+ cu. in.
14. \$7.03.

Page 254; 370

1. \$379.88.
2. 100%.
3. \$500.
4. \$200.
5. $\frac{3}{4}$; $\frac{1}{4}$.
6. $\frac{1}{12}$; $1\frac{1}{2}$ da.
7. $5\frac{1}{11}$ hr.
8. $2\frac{1}{2}$ da.
9. 12 da.
10. 7.3 in.
11. Int. \$25.
12. \$647.90.

Page 255; 371

1. \$11,848.80.
2. $578\frac{1}{2}$ cu. ft.
3. \$4649.80.
4. $6\frac{1}{2}$ %.
5. \$3854.17.
6. \$2172.50.
7. 43.30 ft.
8. \$316.06.
9. 25%.
10. \$55.36.
11. \$345.
12. \$905.42.

Page 256; 372

1. Latter.
2. \$767.33.
3. \$2250.
4. 40¢.
5. 30 mi.
6. \$844.95.
7. $16\frac{1}{2}$ %.
8. \$59.63.
9. \$4704.
10. \$43.20.
11. \$42.86 per
\$100 share.

12. 3 mo.
13. $12\frac{1}{2}$ yr.
14. 6.336 in.

Page 257; 373

1. \$1711.11.
2. $\frac{2}{11}$ gal.
3. 280 gal.;
200 gal.
4. $3\frac{1}{2}$ ft.
5. 1368 sq. ft.
6. \$5.60.
7. \$1050.
8. 4 times.
9. 114¢.
10. 55 mi. 2933½ ft.
11. 36 mo.
12. $134\frac{1}{2}$ A.
13. \$310.
14. \$28.80.

Page 258; 374

1. \$595.
2. 25%.
3. 49 : 98 = 98 :
196.
4. Latter;
30¢ per yd.
5. 56¢.
6. \$222.
7. 4 ft. 2 in.
8. 200,000 lb.
9. \$1279.94.
10. \$313.50.

Page 259; 375

1. $14,912\frac{1}{2}$ %.
2. $18\frac{1}{2}$ %.
3. 7.854 sq. ft.
4. \$0.94.
5. \$17.63.

6. \$34.45.
7. \$41.48 more.
8. \$0.13¢.
9. 461.8152 cu. in.
10. \$4936.60.

Page 260; 376

1. $17\frac{1}{2}$ %.
2. First, $1\frac{1}{4}$ %
better.
3. \$1412.
4. 35%.
5. \$156.08.
6. 63.8 : 36.2.
7. \$0.94.
8. \$0.01375+.
9. \$3.24.
10. 0.816.
11. \$9.21.
12. 11.55.
13. Increase \$15.
14. 608 ; 544.

Page 261; 377

1. 3125.
2. 107.62½.
3. 336.13+.
4. \$12,000.
5. Loss \$16.
6. \$425.
7. \$302.25.
8. First $\frac{1}{2}$ %.
9. 92¢.
10. \$402.
11. $9.36\frac{1}{2}$ %.
12. \$56.53.
13. 1963.5 sq. in.
14. 140.0616 sq. in.

Page 262; 378

1. $\frac{1}{2}$.
2. 70.71—mi.

3. \$206.45;
\$208.
4. \$495.08;
\$494.83
(grace).
5. \$2934.37.
6. @ 25% =
\$16.09 less.
7. 21 rd. × 28 rd.;
588 sq. rd.
8. L. price
\$960;
cost \$400.
9. \$148½.
10. \$26.16.
11. \$889.43.
12. \$0.86.
13. \$25,000.
14. $6\frac{1}{2}$ %.

Page 263; 379

1. $\frac{4}{5}$.
2. 70+ gal.
3. 389.7+ ft.
4. $33\frac{1}{2}$ %.
5. 60%.
6. \$632.10.
7. $66\frac{2}{3}$ %.
8. \$94.50.
9. \$80.
10. \$80.
11. \$640.25.
12. \$450.
13. \$34.31.

Page 264; 380

1. 1.308+.
2. \$518.55.
3. 48 ft.
4. \$555.10.
5. 420.168+.
6. \$17.92.

7. \$352.887+.
8. \$3668.75.
9. \$35,000.
10. $87\frac{1}{2}\%$.
11. \$58,500.
12. \$2971.25.
13. 56.568+ rd.
14. \$344.53.

Page 265; 381

1. $\frac{7}{8}$.
2. \$340.
3. \$40.32.
4. 160 bbl.
5. \$10.75.
6. \$56.77.
7. 16 rd.
8. \$260.40;
\$13.02 com.
9. 56.56+ rd.
10. \$5.50.
11. \$1930.43.
12. $7\frac{1}{2}\%$.
13. 5% .

Page 266; 382

1. \$55,000.
2. 44.74 - %
3. $54\frac{2}{3}\%$.
4. 413,013 $\frac{1}{2}$.
5. 9 A.
6. \$2.75.
7. 177 $\frac{1}{2}$.
8. $29\frac{7}{17}\%$.
9. $\frac{1}{3}$.
10. 166 $\frac{2}{3}$.
11. 3616.037+ bu.
12. 16 $\frac{2}{3}\%$.
13. 93.81 - rd.
14. \$22.68.
15. \$5190.

Page 267; 383

1. $\frac{1}{2}$.
2. 12 ft.
3. 50% .
4. 80.
5. 154.284+ bu.
6. \$140.62 $\frac{1}{2}$.
7. \$5.60.
8. \$90.56.
9. 125%
10. \$2.625.
11. \$12.
12. \$252.53.
13. 125 ft.
14. \$198.

Page 268; 384

1. \$4.375.
2. 106 $\frac{2}{3}\%$.
3. 40 ϕ .
4. \$8.27.
5. $4\frac{1}{11}\%$.
6. \$371.20.
7. \$40.
8. \$105.80.
9. \$391.27.
10. \$620.82.
11. \$187.20.
12. \$220.

Page 269; 385

1. 32 $\frac{1}{2}$.
2. $8\frac{1}{2}\%$.
3. \$6150.
4. 165 ft.
5. \$3761.25.
6. 966 $\frac{2}{3}\%$.
7. \$421.80.
8. $5\frac{1}{2}$ ft.
9. \$5.47.

10. Six hund. six
thous. and
fifteen tril-
lionths.
11. Nothing.
12. 14 $\frac{2}{3}\%$.
13. \$625.

Page 270; 386

1. 53 $\frac{1}{2}$.
2. \$67.20.
3. \$28.80.
4. \$17.36-.
5. \$51,568.
6. 9929.4.
7. 62.3376+ min.
8. 1765.17 gal.
9. 1:10.
10. \$20.
11. \$5157.43.
12. \$4499.25.

Page 271; 387

1. 0.016 $\frac{1}{2}$.
2. \$21.
3. 44.74 - %
4. 2473.
5. 68 $\frac{1}{2}\%$.
6. \$93.75.
7. \$33,333 $\frac{1}{2}$.
8. 10 ϕ .
9. 12 da.
10. \$283.50.
11. 32.725 lb.
12. 141 $\frac{1}{2}$ cu. yd.
13. 12 rd.

Page 272; 388

1. $2\frac{7}{8}$.
2. \$5413 $\frac{1}{2}$.

3. \$94.52.
4. \$418.88.
5. \$56,250; $3\frac{1}{3}\%$
6. \$25.92.
7. 64 men.
8. \$8000.
9. \$76.
10. \$377.32.
11. \$150.
12. \$421.55.

Page 273; 389

1. $\frac{17}{15}$.
2. 159,155 cu. ft.
3. 116 ft.
4. Loses \$10.
5. \$15.80.
6. $\frac{1}{2}\frac{1}{2}$.
7. \$96.21.
8. \$577.40.
9. \$386; cost
600 fr.
10. \$12.75.
11. 0.02078125.
12. 810.
13. \$5700.

Page 274; 390

1. 21 $\frac{1}{2}$.
2. 21 $\frac{1}{4}$.
3. Seven thou-
sand four
hundred
eighty-five
and two
ninths ten-
thou-
sandths.
4. \$43.20.
5. \$82.08.

6. \$2007.50.
7. 125.
8. \$1337.
9. $24\frac{1}{2}$ bu.
10. \$2.13.
11. \$150.

Page 275; 391

1. $2\frac{3}{4}$.
2. \$8625.
3. \$3978.72.
4. $66\frac{2}{3}$.
5. 125%
6. \$9.45.
7. 8% .
8. \$21.84.
9. \$7.48.
10. \$1.80.
11. \$4824.
12. \$32.18; \$4.95
per thous

Page 276; 392

1. $12\frac{3}{4}$.
2. 720.288+.
3. $87\frac{1}{2}$ sq. yd.
4. \$7400, $4\frac{1}{3}\%$.
5. \$39.65.
6. \$200 income;
 $3\frac{1}{2}\%$
7. \$12.
8. \$24.79.
9. 80.
10. \$26.40.
11. \$53.90.
12. \$48.
13. \$640.

Page 277; 393

1. 4.
2. $6\frac{1}{2}\%$.
3. 17 ft.
4. \$9; 60% .
5. \$1115.

6. 15¢.
7. 71.55+rd.
8. 20% .
9. \$560.
10. 1728.
11. $5\frac{1}{2}\%$; \$0.75
per bu.; \$558.
12. \$495.58
(grace);
\$495.83.

Page 278; 394

1. \$18.29.
2. \$36.75.
3. 20 in.
4. 5¢.
5. \$739.78.
6. 9 cd.
7. \$23.
8. \$26.18.
9. \$4.50.

10. \$88.36.
11. \$1562.50.
12. \$8.66.

Page 279; 395

1. $6\frac{2}{3}$.
2. \$1546.79.
3. \$150.
4. 0.853+.
5. \$120.
6. 1.002.
7. 32 shares.
8. \$59.45.
9. \$10.33.
10. $\frac{2}{3}$.
11. 12.806+ft.
12. Variable.
13. July 2, noon,
or July 2, 12
p.m.
14. 75¢.
15. $12\frac{1}{2}\%$.



